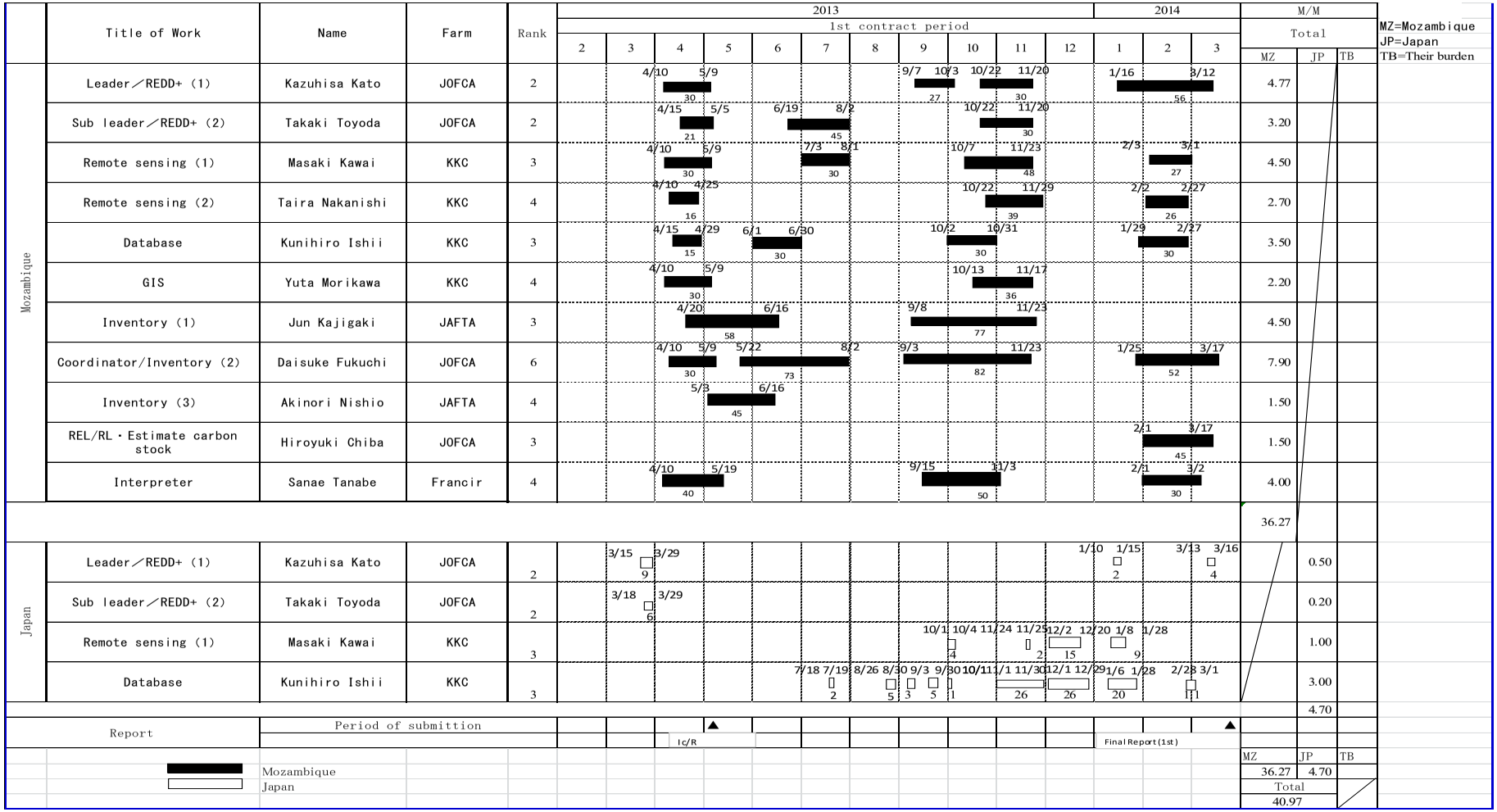
Appendix1 Assignment and Work Period of Japanese Experts (from 1st year to 5th year)

Assignment and Work Period of 1st year



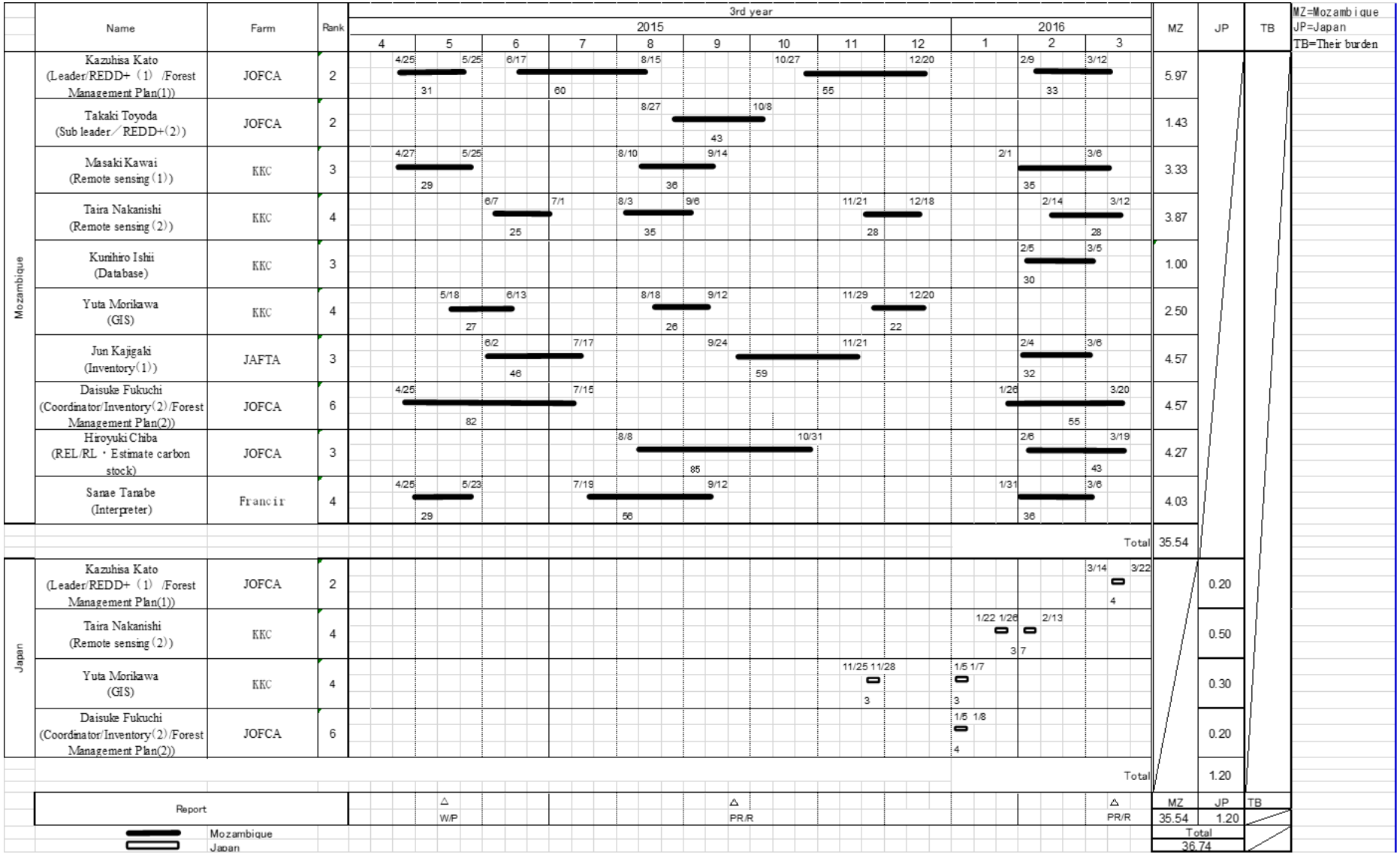
Assignment and Work Period of 2nd year

	Title of Work	Name	Farm	Rank	2014 (4 5 6 7 8 9 10 11 12) / 2015 (1 2 3) — 2nd contract period	M/M Total MZ	M/M Total JP	M/M Total TB
Mozambique	Leader／REDD+(1)	Kazuhisa Kato	JOFCA	2	4/28–5/21 (24); 6/20–7/3 (83); 9/10–3/8 (40)	4.90		
	Sub leader／REDD+(2)	Takaki Toyoda	JOFCA	2	9/5–10/2 (28)	0.93		
	Remote sensing(1)	Masaki Kawai	KKC	3	5/7–7/5 (60); 8/10–10/4 (56); 1/20–3/12 (52)	5.60		
	Remote sensing(2)	Taira Nakanishi	KKC	4	9/6–9/30 (25); 1/27–3/2 (35)	2.00		
	Database	Kunihiro Ishii	KKC	3	8/8–9/6 (30); 2/1–3/2 (30)	2.00		
	GIS	Yuta Morikawa	KKC	4	5/19–7/5 (48); 8/12–9/14 (34); 11/23–12/6 (14); 1/27–2/12 (17)	3.77		
	Inventory(1)	Jun Kajigaki	JAFTA	3	5/14–7/12 (60); 8/6–10/4 (60); 1/16–3/4 (48)	5.60		
	Coordinator/Inventory (2)	Daisuke Fukuchi	JOFCA	6	4/28–7/23 (87); 8/18–10/8 (52); 1/22–3/16 (54)	6.43		
	Inventory(3)	Akinobu Sato	JAFTA	4	6/20–7/19 (30)	1.00		
	REL/RL・Estimate carbon stock	Hiroyuki Chiba	JOFCA	3	6/15–7/14 (30); 8/29–9/27 (30); 2/1–3/4 (32)	3.07		
	Interpreter	Sanae Tanabe	Francir	4	4/28–5/24 (27); 6/16–8/2 (48); 9/5–9/17 (13); 1/29–3/2 (33)	4.03		
						39.33		
Japan	Leader／REDD+ (1)	Kazuhisa Kato	JOFCA	2	3/10–3/14 (4)		0.20	
	Coordinator/Inventory (2)	Daisuke Fukuchi	JOFCA	6	10/9–10/29 (10)		0.50	
							0.70	

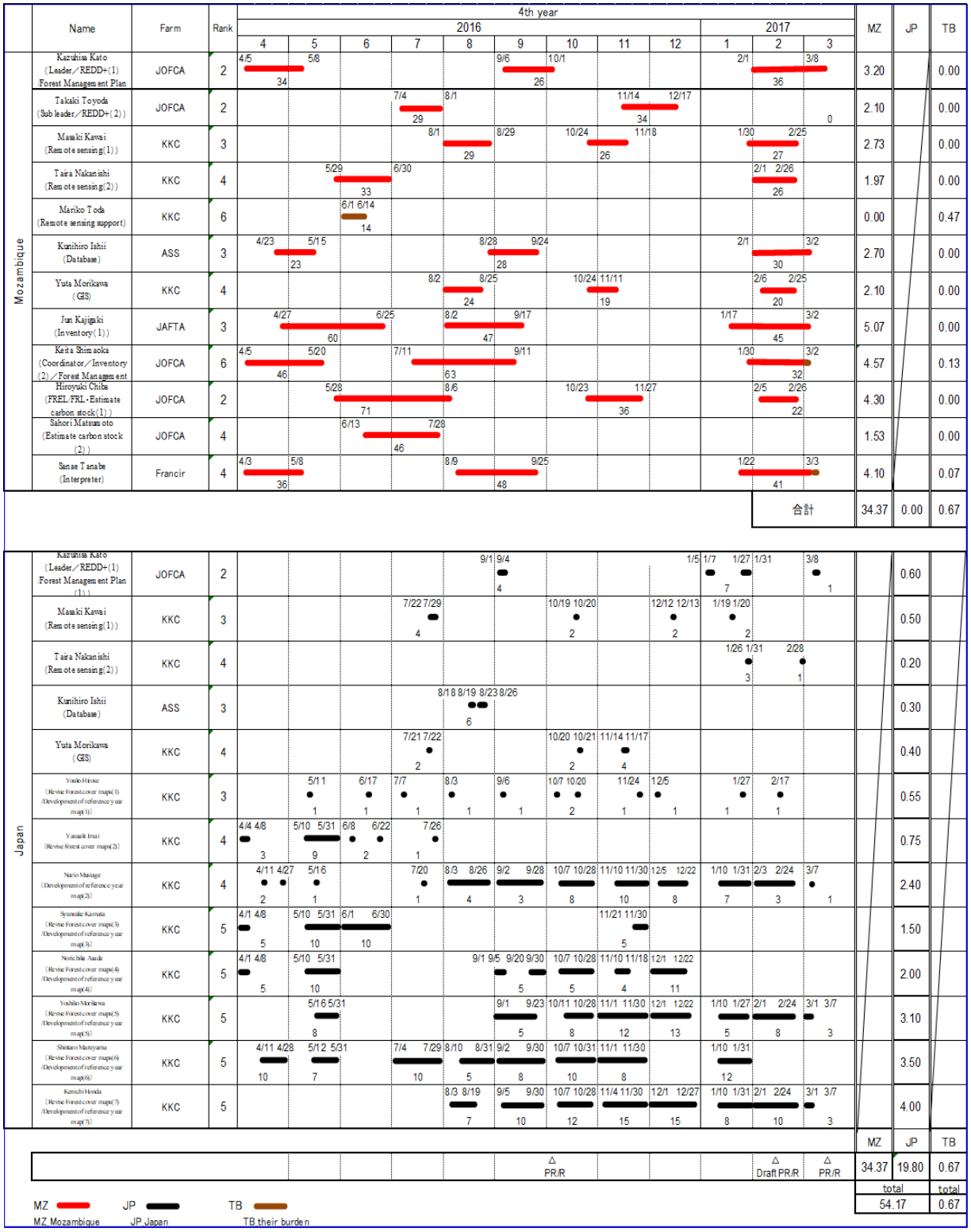
MZ=Mozambique
JP=Japan
TB=Their burden

Report	MZ	JP	TB
△ W/P; △ PR/R; △ It/R	39.33	0.70	
Mozambique	Total		
Japan	40.03		

Assignment and Work Period of 3rd year



Assignment and Work Period of 4th year



Assignment and Work Period of 5th year

	Name	Farm	Rank	5th year: 2017 4	5	6	7	8	9	10	11	12	2018 1	2	3	4	MZ	JP	TB
MZ	Kazuhisa Kato (Leader／REDD+(1)/Forest Management Plan(1))	JOFCA	2	4/18	5/18 31			8/7	(9/7) 32		11/1 11/25 25			1/30	(3/11) 40			4.30		0.00
	Takaki Toyoda (Sub leader／REDD+(2))	JOFCA	2				7/25	8/10 17	9/14	10/12 29								1.53		0.00
	Masaki Kawai (Remote sensing(1))	KKC	3	4/18	5/9 22				8/28	9/16 20				1/30	3/3 33			2.50		0.00
	Taira Nakanishi (Remote sensing(2))	KKC	4				7/26	8/21 27						2/18	3/7 17			1.50		0.00
	Kunihiro Ishii (Database(1))	ASS	3					8/7	8/23 9/2	9/14 9/17		12/9	12/17 9	2/18	3/4 14			1.80		0.10
	Yuto Fujita (Database (2))	ASS	3									12/9	12/17 9					0.00		0.30
	Yuta Morikawa (GIS)	KKC	4			6/4	6/25 22											0.73		0.00
	Jun Kajigaki (Inventory(1))	JAFTA	3		5/13	6/27 46								2/3	3/4 29			2.53		0.00
	Keita Shimaoka (Coordinator／Inventory(2)／Forest Management(2))	JOFCA	6	4/18	5/17 41	5/25 6/4	7/23	8/19 28		10/10 33	11/11			2/3	3/11 36			4.57		0.03
	Hiroyuki Chiba (FREL/FRL・Estimate carbon stock (1))	JOFCA	2		5/30	59	7/27	8/22	54	10/14				2/6	3/10 32			4.86		0.00
	Sanae Tanabe (Interpreter)	Francir	4	4/18	5/25 38			8/7	9/16 41					1/27	3/11 43			4.10		0.00
																	total	28.42	0.00	0.43

JP	Kazuhisa Kato (Leader／REDD+(1)/Forest Management Plan(1))	JOFCA	2		5/22 5/29 3											(4/5) (4/10) 6		0.45		
	Masaki Kawai (Remote sensing(1))	KKC	3		5/11 5/15 3													0.15		
	Taira Nakanishi (Remote sensing(2))	KKC	4		5/10 5/18 3													0.15		
	Kunihiro Ishii (Database(1))	ASS	3	4/19 4/24 3	5/29 5/3 3	6/2 6/7 6/19 6/21 7							1/5 1/19 1/23,25,30,31 14					1.35		
	Yuta Morikawa (GIS)	KKC	4	4/19 4/21 3		6/1 6/2 6/27 6/30 5.3333												0.42		
	Report			△ W/P					△ PR/R					△ DF				MZ	JP	TB
																		28.42	2.52	0.43
																		Total		Total
																		30.94		0.43

MZ_Mozambique JP_Japan TB_their burden

Appendix 2 The Project implementation structure (From 1st year to5th year)

The Project implementation structure and JICA team's implementation structure are shown below.

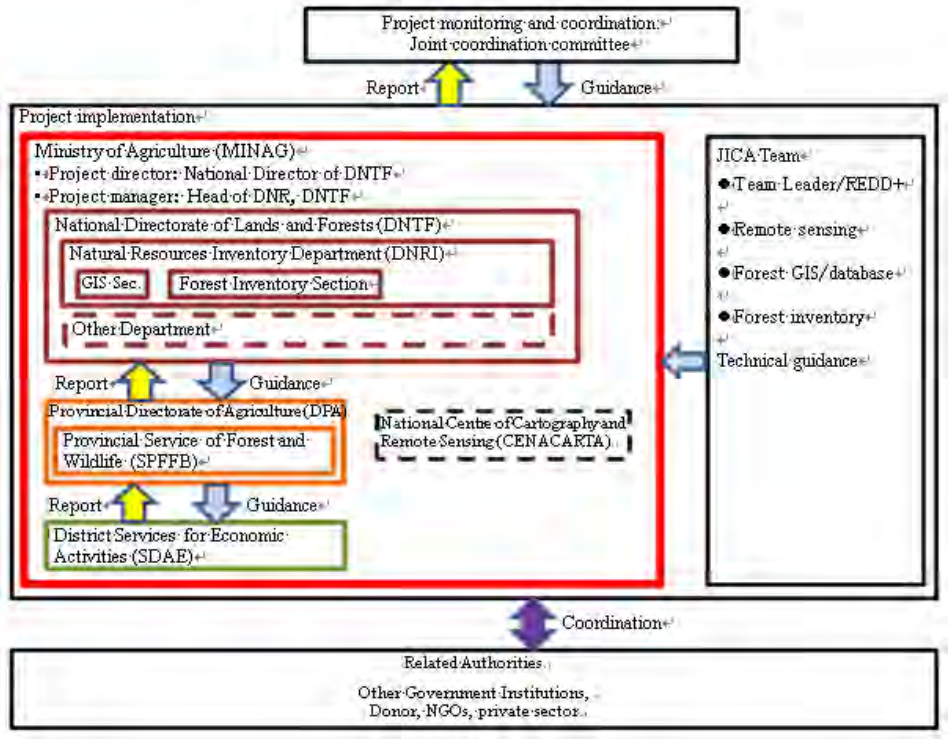


Figure 1 project implementation structure(1st year and 2nd year)

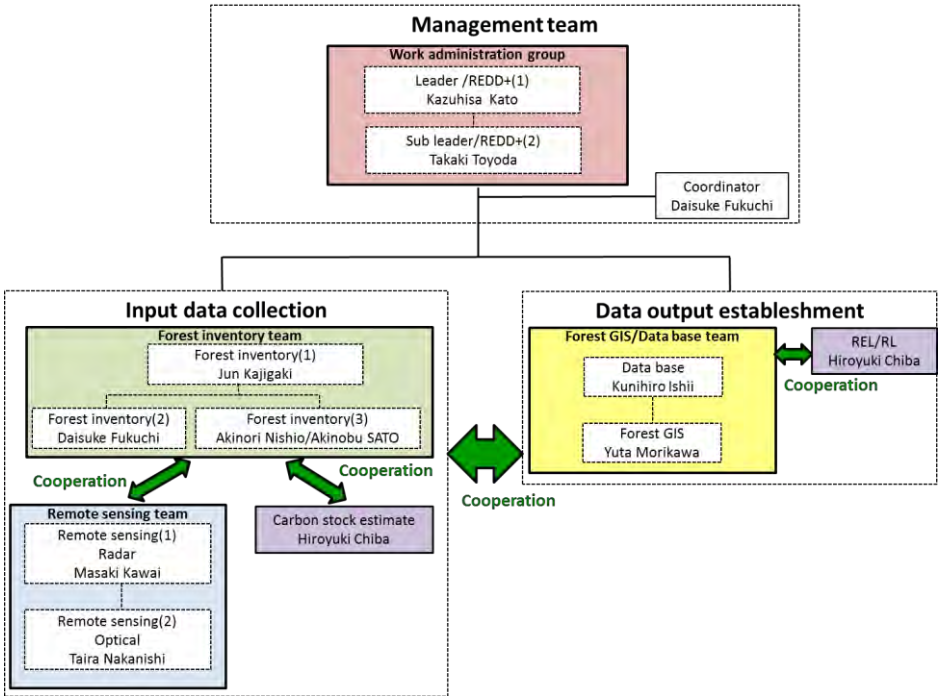


Figure 2 JICA team's implementation structure(1st year and 2nd year)

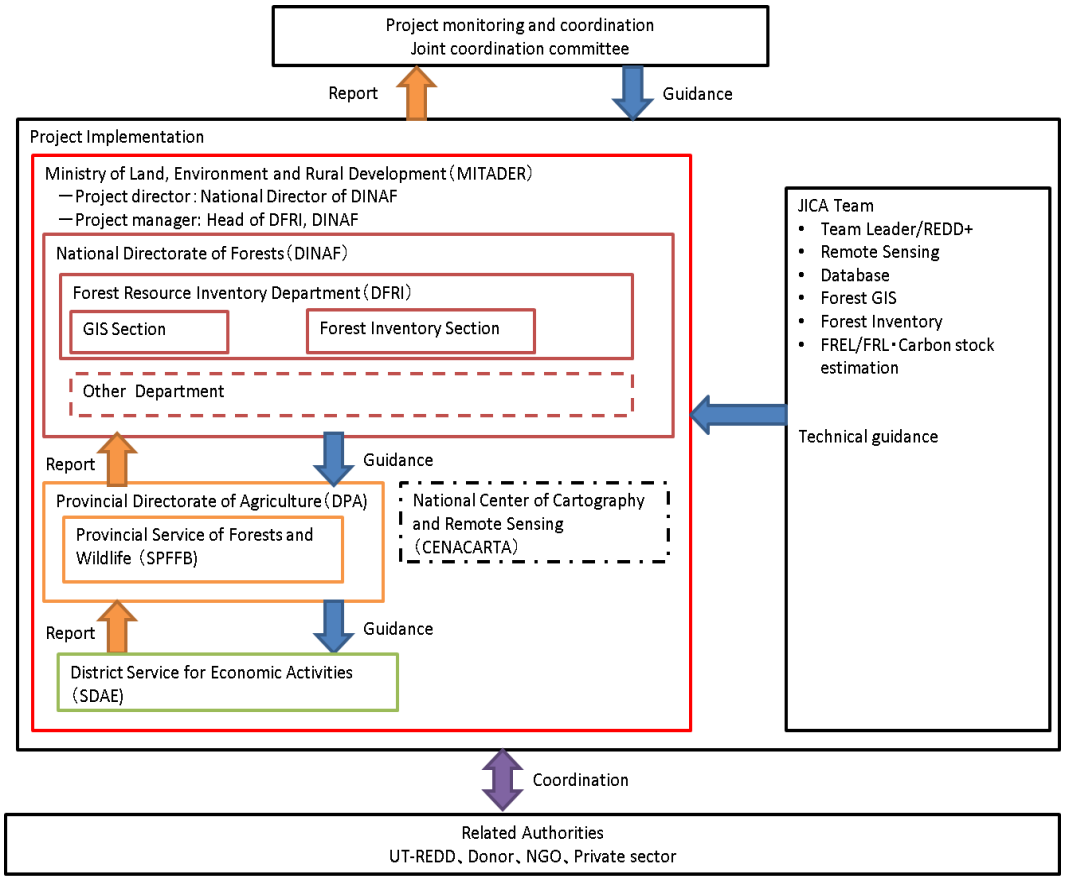


Figure 3 project implementation structure(3rd year)

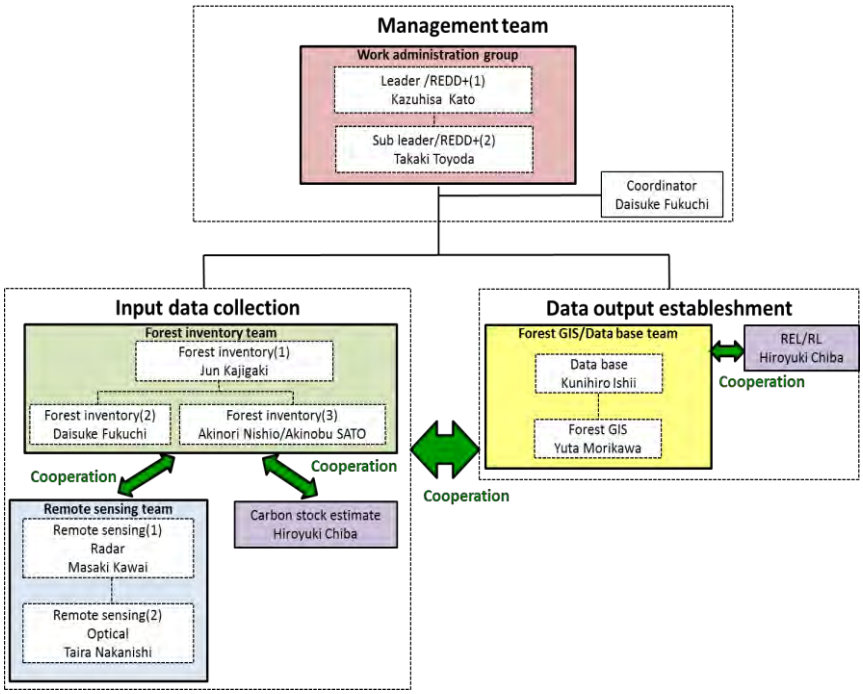


Figure 4 JICA team's implementation structure(3rd year)

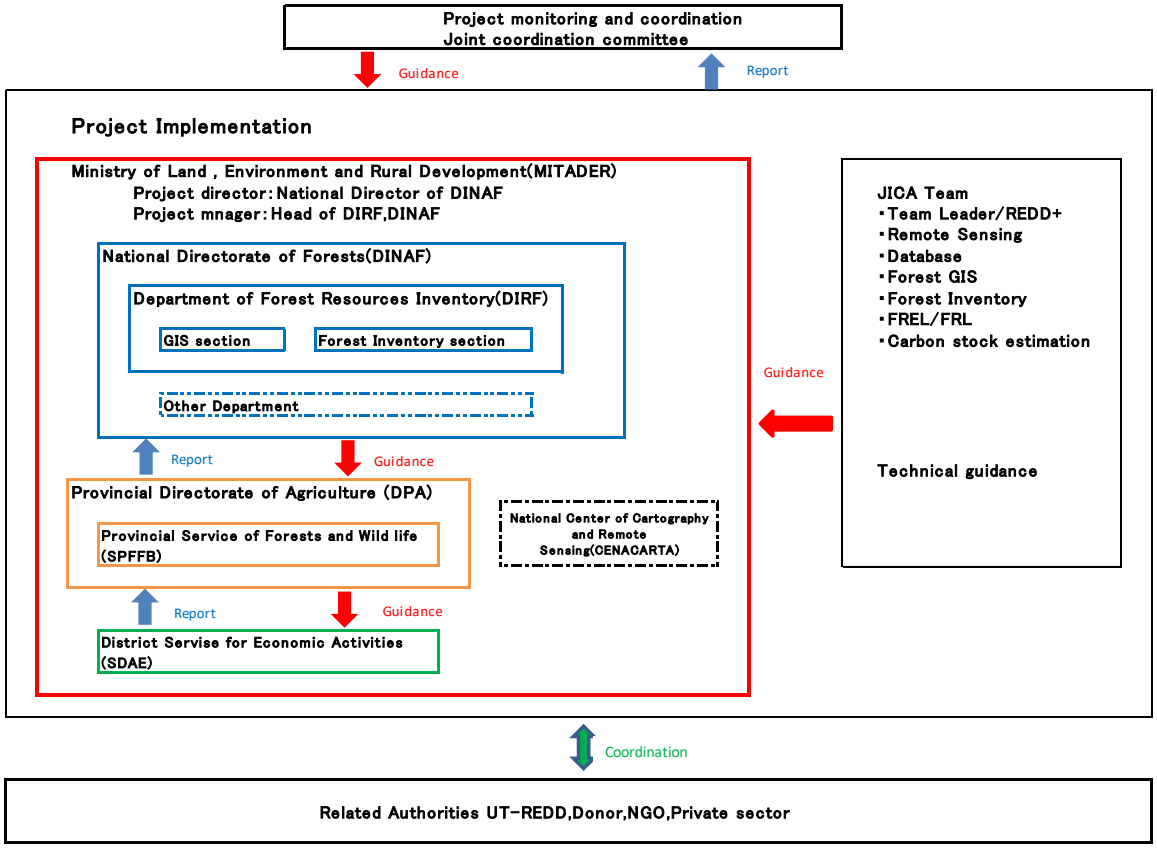


Figure 5 project implementation structure(4th year)

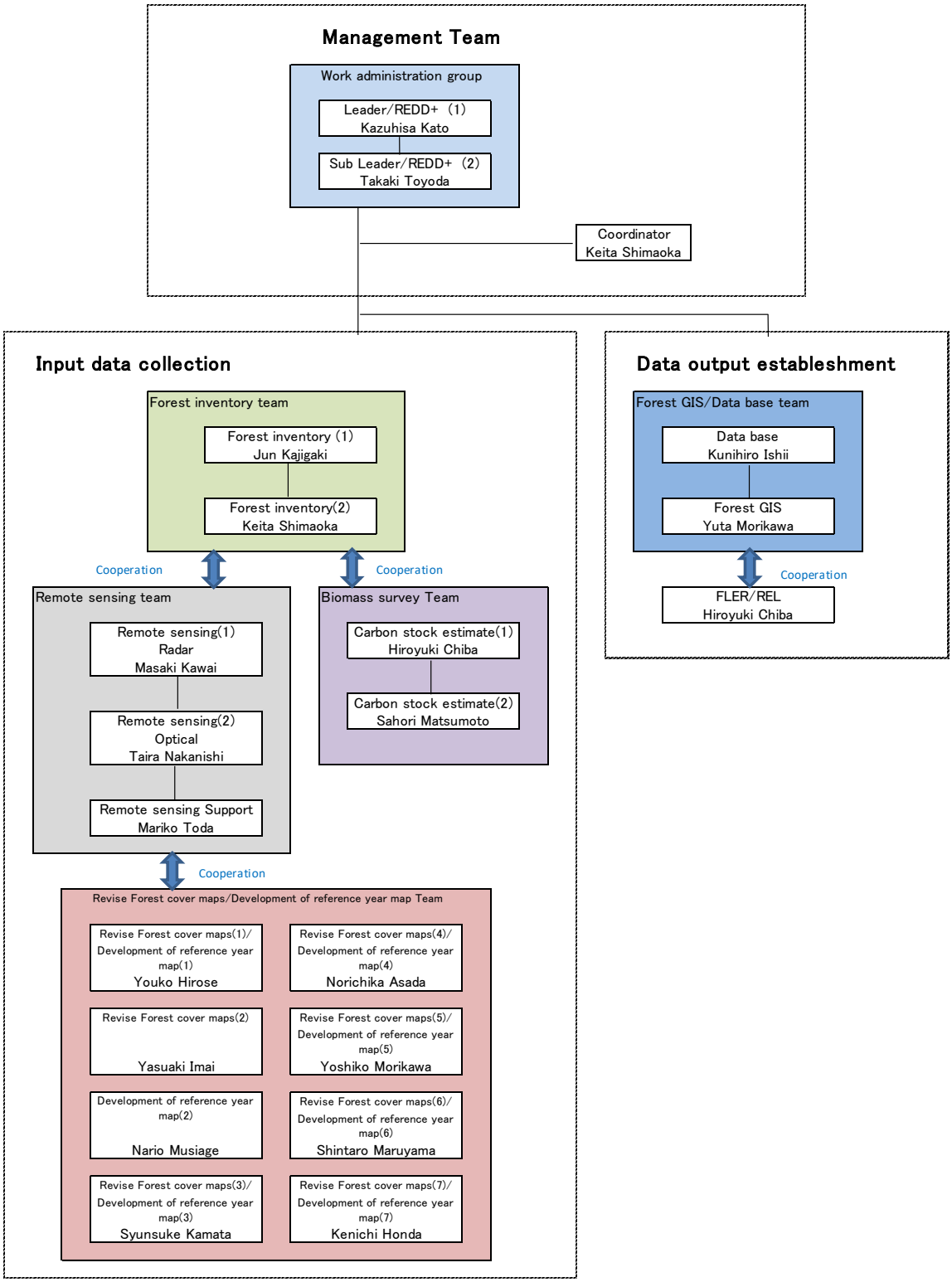


Figure 6 JICA team's implementation structure(4th year)

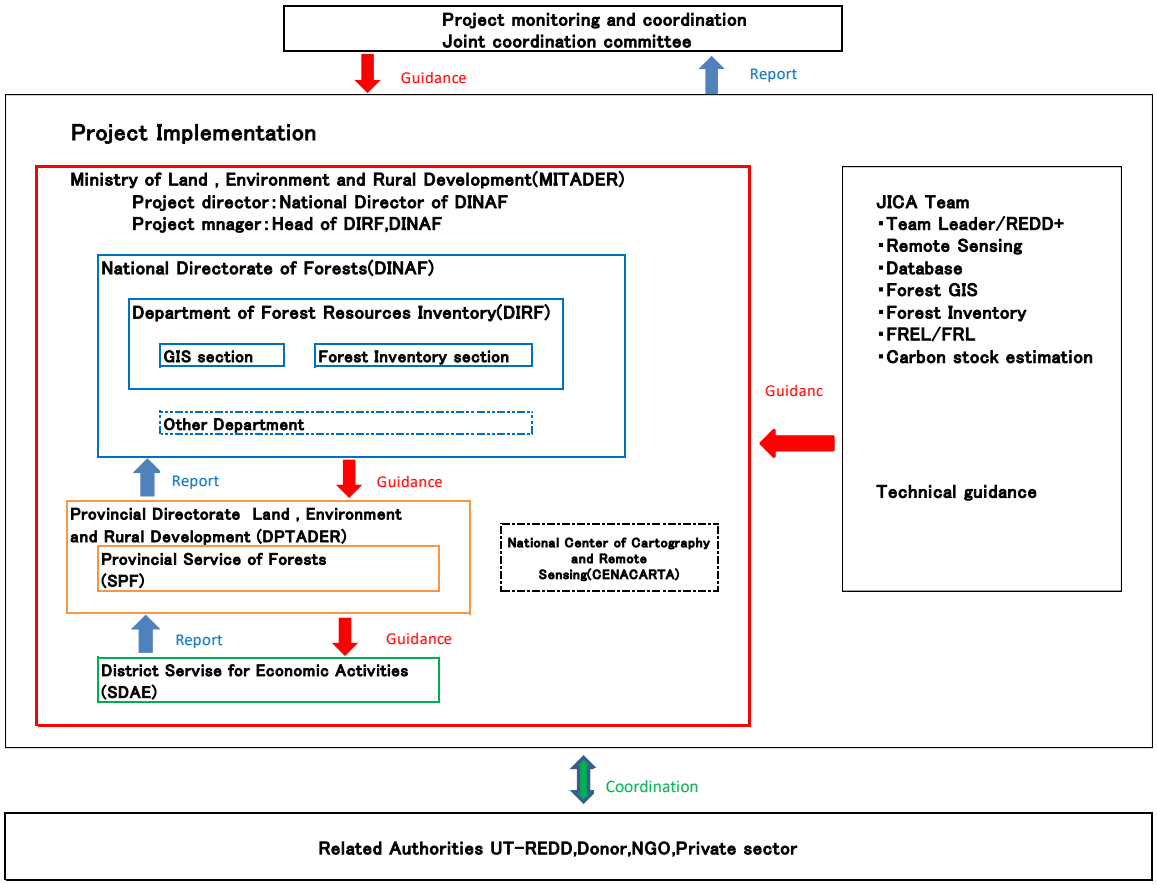


Figure 7 project implementation structure(5th year)

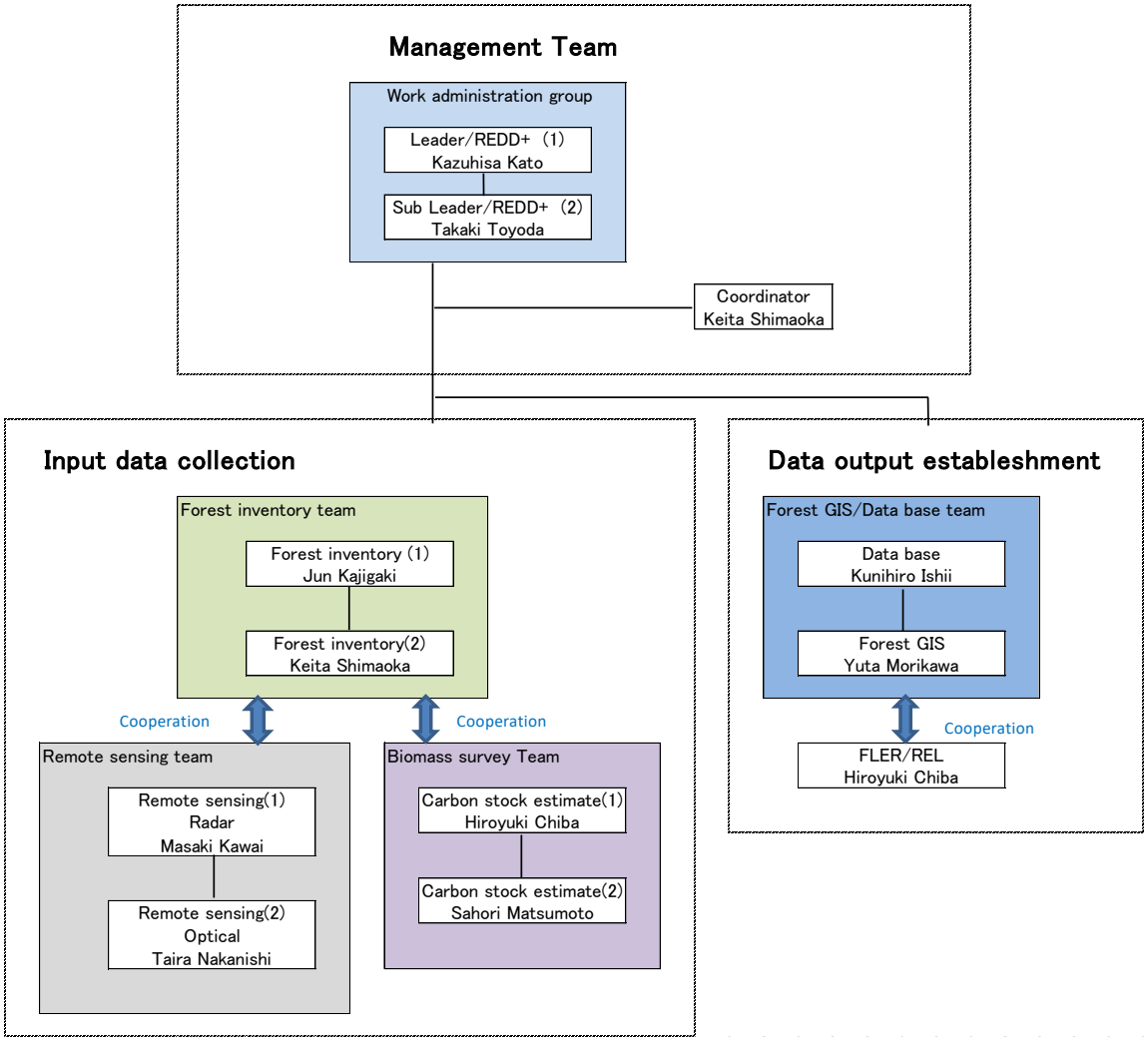


Figure 8 JICA team's implementation structure(5th year)

Appendix3　Records of Trainings in Japan(from 1st year to 5th year)

1 The first year

Title of the Training Programme: Forest Resource Information System for REDD+ and Governance

Duration: From 25th August to 1st September 2013

Name of Participants	Position
Simão Pedro Santos Joaquim	National Director, National Directorate of Lands and Forests, Ministry of Agriculture
Joaquim Armando Macuácua	Head of Department, Department of Natural Resources Inventory, National Directorate of Lands and Forests, Ministry of Agriculture

2 The second year

Title of the Training Programme: Forest Remote Sensing and GIS for REDD+

Duration: From 30th September to 18th October 2014

Name of Participants	Position
Mr. Danilo Cunhete	Forest officer, Department of Natural Resources Inventories, National Directorate of Lands and Forests, Ministry of Agriculture
Mr. Aly Awasse	Chief of Wildlife Sector & Community Forest and Wildlife Unit, Provincial Service of Forest and Wildlife Provincial Directorate of Agriculture, Nampula Province

3 The third year

Title of the Training Programme: Forest Remote Sensing and GIS for REDD+

Duration: From 10th August to 5th September 2015

Name of Participants	Position
Mr. Julião Chamuce Cuambe	Forest Officer, DNF-Department of Forest, National Directorate of Lands and Forests, Ministry of Agriculture
Ms. Belmira Antonio Saeze	Officer, Department of Cartography and Remote sensing,

	National Center of Cartography and Remote sensing

4 The fourth year

Title of the Training Programme: Utilization of Forest Resource Information System to REDD+ and Governance

Duration: From 6th to 10th June 2016

Name of Participants	Position
Mr. Xavier Sakambuera SAILORS	National Director National Directorate of Forestry, Department of Inventory of Forestry Resources, Ministry of Land, Environment and Rural Development in the Republic of Mozambique
Mr. Joaquim Armando MACUACUA	Forest Officer and Focal Point of the Platform of Information System of Sustainable Forest Resources to Monitor REDD+ National Directorate of Forestry, Department of Inventory of Forestry Resources, Ministry of Land, Environment and Rural Development in the Republic of Mozambique

5 The fifth year

Title of the Training Programme: Development of Reference Year Map and Deforestation Monitoring by Radar Image Analysis

Duration: From 2nd to 22nd July 2017

Name of Participants	Position
Mr. Mugas Pachis Antunes	Forest Officer Department of Inventory of Forestry Resources, Ministry of Land, Environment and Rural Development in the Republic of Mozambique
Mr. Dembele Obasanjo Salvador	Forest Officer Department of Inventory of Forestry Resources, Ministry of Land, Environment and Rural Development in the Republic of Mozambique

MINUTES OF MEETING
ON
THE INCEPTION REPORT DISCUSSION
FOR
THE PROJECT
FOR
"THE ESTABLISHMENT OF SUSTAINABLE FOREST RESOURCE INFORMATION PLATFORM FOR MONITORING REDD+"
IN THE REPUBLIC OF MOZAMBIQUE

Pursuant to the objectives of the Record of Discussion (R/D) for the Project for "The Establishment of Sustainable Forest Resource Information Platform for Monitoring REDD+"" in the Republic of Mozambique (hereinafter referred to as "the Project"), agreed on October 12th, 2012 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Agriculture, a Japanese project team (hereinafter referred to as "the Team") headed by Mr. Kazuhisa KATO commenced to cooperate with the National Directorate of Land and Forests (hereinafter referred to as "DNTF") for the Project from April 2013.

The Team submitted the draft Inception Report (hereinafter referred to as "the Report") in English to the Mozambique side; DNTF and the Team conducted a series of discussion on the implementation of the Project based on the Report. The main issues discussed by the both sides in relation to the Project are shown in the document attached hereto.

Mozambique
26th April 2013

Mr. Simao Pedro Santos Joaquim
National Director
National Directorate of Land and Forests
Ministry of Agriculture

Mr. Kazuhisa KATO
Team Leader of the Team
Japan International Cooperation Agency

Attached Document -1

The Team explained contents of the Report regarding mainly project implementation concepts and methods. The Mozambique side and the Team discussed and agreed on the contents as listed in the following items.

1. The Team explained that the Team proposed the concepts of implementation as displayed in the Report and it is mentioned in the Report that any changes of the concepts can be considered through the discussion between Mozambique side and Japanese side. Therefore, even though no modification of the Reports will be made, both sides can propose any changes of the concepts in the future. Such changes will be noted in the other reports such as progress reports. Regarding project implementation methods from year 2 to year 5, the Team also explained that the methods can be changed based on the results of activities and achievement of the previous years. The Team explained that the Team is supposed to prepare an activity plan in each year taking into the consideration of the results of activities in the previous years.

2. Mozambique side basically agreed on the contents of the Report through the explanation. However, if any modifications on some parts of the Report which have not clearly mentioned yet are deemed necessary, Mozambique side will submit written comments to Japanese side by 29th April. After having discussions and confirming the modification by the both sides, the Report will be finalized.

3. Japanese side agreed to prepare a Portuguese translation for main parts of the Report in response to the request from Mozambique side.

4. Both sides agreed to set the technical working groups for each activity field (tentative) as mentioned in the Report, in order to discuss the technical issues such as concept of the activities, the designs, and the methodology, etc.

5. The Mozambique side agreed to comply with the request from Japanese side such as the provision of required data and information which DNTF keeps, appointment of counterpart personnel, and provision of materials and equipment provided through "Forest Preservation Programm" of "Japanese Programme Grant Aid for Environment and Climate Change" among others as mentioned in the Report. The Mozambique side also assured to make utmost effort to secure a budget necessary to cover the cost of inputs to be provided by DNTF-MINAG for the Project as written in the R/D especially from Year 2 and subsequent years.

6. Mozambique side emphasized importance of the capacity building for the technical staff associated with the Project. The Team notified that the Team recognized the importance of the capacity development for the sustainable management of the forest resource information platform. In addition, the Team also emphasized that activities mentioned in the Report should be implemented based on the discussions with each technical working group and capacities of any Mozambique side staff in the groups should also be strengthened through the activities of the groups.

Attached Document -2

1. Agenda of the meeting on 22nd April 2013

Time	Contents	Responsible by
9:20-9:30	Opening remark	National Director of DNTF
9:30-11:00	Presentation of the Inception Report	Japanese project team
11:00-11:50	Discussion	Participants
11:50-12:00	Conclusion and closing	National Director of DNTF

2. List of the participants of the meeting.

National Directorate of Land and Forests (DNTF)

Simao Pedro Santos Joaquim	National Director	DNTF
Yolanda Gonçalves	Head	Department of Planning
João Júlio João	Technician	Department of Planning
Joaquim Macuacua	Head	Department of Natural Resource Inventory
Milda Filipe Mausse	Technician	Department of Natural Resource Inventory
Castelo Banze	Technician	Department of Natural Resource Inventory
Isaac Omar	Technician	Department of Natural Resource Inventory
Pachis Mungas	Technician	Department of Natural Resource Inventory
Danilo Conhete	Technician	Department of Natural Resource Inventory
Olavo Manique	Technician	Department of Law Enforcement
Salvador Jossias	Head	Department of Land Surveying
Marcelino Foloma	Head	Department of Wildlife
Rezia Cumbi	Technician	Department of Wildlife
Alice I.Ngonga	Head	Department of Administration
Agostinho Pedro Neve	Technician	Department of Administration
Palmira Mugabe	Head	Department of Cadastral
Fátima Kanji	Technician	Community Based Management Division

Japan International Cooperation Agency

Nyosuke NAKASE	Assistant of Representative Residence
Yasuko INOUE	JICA Expert

The Team

Kazuhisa KATO	Leader/REDD+ (1)
Takaki TOYODA	Vice Leader/REDD+ (2)

Masaki KAWAI	Remote sensing (1)
Taira NAKANISHI	Remote sensing (2)
Kunihiro ISHII	Database
Yuta MORIKAWA	GIS
Jun KAJIGAKI	Forest Inventory (1)
Daisuke FUKUCHI	Forest Inventory (2)/Coordinator
Sanae TANABE	Interpreter

MINUTES OF MEETING
ON
THE JOINT COORDINATING COMMITTEE
FOR
THE PROJECT
FOR
"THE ESTABLISHMENT OF SUSTAINABLE FOREST RESOURCE INFORMATION PLATFORM FOR MONITORING REDD+"
IN THE REPUBLIC OF MOZAMBIQUE

Pursuant to the objectives of the Record of Discussion (R/D) for the Project for "The Establishment of Sustainable Forest Resource Information Platform for Monitoring REDD+" in the Republic of Mozambique (hereinafter referred to as "the Project"), agreed on October 12th, 2012 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Agriculture, the first Joint Coordinating Committee (hereinafter referred to as "the JCC") was held on 14th November 2013.

The main issues discussed among the National Directorate of Land and Forests (hereinafter referred to as "DNTF"), JICA Mozambique office and the JICA project team (hereinafter referred to as "the Team") are shown in the document attached hereto.

Maputo
14th November 2013

Mr. Simão Pedro Santos Joaquim
National Director
National Directorate of Land and Forests
Ministry of Agriculture

Mr. Kazuhisa KATO
Team Leader of the Project
Japan International Cooperation Agency

Witnessed by

Mr. Katsuyoshi SUDO
Chief Representative
Japan International Cooperation Agency
Mozambique Office

Attached Document -1

The Team explained the framework of the project including outline of structure, implementation structure, activities in the first year and the progress, fundamental concepts from technical and management aspects. Mozambican side and Japanese side discussed the contents for the project implementation as listed in the following items.

1. Mozambican side understood the progress of the Project and basically agreed on the way of project implementation. The Team showed no critical problems for the Project implementation so far.

2. Mozambican side suggested that forest inventory should be properly designed taking into consideration of the design which was implemented in the AIFM (Integrated Assessment of Land and Forest) project. Japanese side agreed on the suggestion and proposed the design would be discussed in the technical working group on the forest inventory.

3. Mozambican side proposed that member of the technical working groups would be expanded and staff in provincial level should be incorporated into the member. Both sides agreed to discuss this issue continuously.

4. Both sides agreed that SPFFB (Provincial Service of Forest and Wildlife) and SDAE (District Services for Economic Activities) should be more involved in the project activities especially for forest inventory and ground-based forest monitoring. DNTF will take an initiative for the involvement.

5. Japanese side requested Mozambican side to secure project budget for next year, and to accelerate the process to hand over the equipment provided under the Forest Preservation Programme of Japanese Grant Aid for Environment and Climate Change to each province as well as central government and to secure to utilize such equipment for the Project implementation.

6. Both sides agreed to hold next JCC in late April or early May of 2014 to explain results of the first year of the Project and to discuss and decide the implementation plan in the second year of the Project.

Attached Document -2

1. Agenda of the JCC meeting on 14th November 2013

Time	Contents	Responsible by
9:00 – 9:10	Opening remarks from Mozambican side	National Director of DNTF
9:10 – 9:15	Opening remarks from Japanese side	Chief Representative, JICA office
9:15 – 9:35	Presentation : Framework of The Project for the Establishment of Sustainable Forest Resources Information Platform for Monitoring REDD+ - Project Objectives and Outline of Structure - Project Implementation Structure - Activities in the First Year and the progress - Fundamental Concepts from Technical Aspects and Management Aspects - The Forest Resource Information Platform - Requests for Arrangements to Mozambique Counterpart	JICA Study Team - Kazuhisa Kato
9:35 – 10:00	Discussion; Q/A	National Director of DNTF

2. List of the participants of the meeting.

National Directorate of Land and Forests (DNTF)

Dr. Simão Pedro Santos Joaquim	National Director DNTF
Eng. Salvador Jossias	Head of Department of Surveying
Dr. Alice Ngonga	Head of the Department of Finance
Sr. Danilo Cunhete	DIRN Technician
Eng. Olivia Silva Amosse	Head of the Department of Law Enforcement
Eng. Darlindo Pechisso	Head of the Department of Forest
Dr. Vitoriano Taela	Head of the Department of Human Resources
Eng Aida Zita Mutimucuio	Plan Department Technician
Eng. Renato Timane	DIRN Technician
Eng. Isaac Omar	DIRN Technician
Eng. Cláudio Afonso	Forest Department Technician
Eng. Julião Cuambe	Law Enforcement Department Technician
Eng. Alima Taquidir	Forest Department Technician
Eng. Hilário Akissa	Forest Department Technician
Eng. Carmen	Wildlife Department Technician

Japan International Cooperation Agency Mozambique Office

Mr. Katsuyoshi Sudo	Chief Representative
Ms. Chiharu Morita	Deputy Resident Representative
Mr. Ryosuke Nakase	Assistant Resident Representative
Mr. Elisio Chiunze	Assistant Staff

The Team

Mr. Kazuhisa KATO	Leader/REDD+ (1)
Mr. Takaki TOYODA	Vice Leader/REDD+ (2)
Mr. Yuta MORIKAWA	GIS

MINUTES OF MEETING
ON
THE JOINT COORDINATING COMMITTEE
FOR
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"THE ESTABLISHMENT OF SUSTAINABLE FOREST RESOURCE INFORMATION PLATFORM FOR MONITORING REDD+"
IN THE REPUBLIC OF MOZAMBIQUE

Pursuant to the objectives of the Record of Discussion (R/D) for the Project for "The Establishment of Sustainable Forest Resource Information Platform for Monitoring REDD+" in the Republic of Mozambique (hereinafter referred to as "the Project"), agreed on October 12th, 2012 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Agriculture, the second Joint Coordinating Committee (hereinafter referred to as "the JCC") was held on 9th May 2014.

The main issues discussed among the National Directorate of Land and Forests (hereinafter referred to as "DNTF"), JICA Mozambique office and the JICA project team (hereinafter referred to as "the Team") are shown in the document attached hereto.

Maputo
9th May 2014

Mr. Simão Pedro Santos Joaquim
National Director
National Directorate of Land and Forests
Ministry of Agriculture

Mr. Kazuhisa KATO
Team Leader of the Project
Japan International Cooperation Agency

Witnessed by

Mr. Katsuyoshi SUDO
Resident Representative
Japan International Cooperation Agency
Mozambique Office

Attached Document -1

The objective of the meeting was to present the report of the first year's activities of the Project and the implementation plan for the second year.

DNTF explained results and output of the implementation of project activities in the first year including outline of project structure, and the Team explained the plan of implementation of project activities in the second year including changing points of fundamental concepts from technical and management aspects, and points to be confirmed for the activities on and after the third year. Mozambican side and Japanese side discussed the contents for the project implementation as listed in the following items.

1. The JCC understood the progress of the Project in the first year and agreed the project implementation plan for the second year.

2. The JCC confirmed that the national forest cover map 2010 would be prepared by Mozambican side under the technical cooperation of implementation of ground truth survey and the method of preparation by the Team. Moreover, the JCC understood that the time of year of completion of the forest cover map has an influence on 1) method of preparation of forest cover maps for reference years from 1990 to 2010, 2) forest cover map for design of forest inventory survey in 16 pilot districts of eight provinces except for Gaza and Cabo Delgado provinces, and 3) the scale of setting REL/RL.

3. The JCC agreed that the Team would submit the Project Implementation Plan for the second year based on the agreement of the JCC.

4. The JCC decided to open the outputs of the Project such as the forest resource information platform, progress report and manual. DNTF assured that these outputs would be basically opened to the concerned organization. In addition, a coordination meetings with related organizations should be established to discuss operation, application policies and data update method of the Forest Resource Information Platform before the platform is launched

5. The JCC recommended that the effort should be continued to assure budget and personnel within the periods of and after end of the Project in order to implement the Project activities and utilize the outputs of the Project, and prudently consider correspondence policy to other donor projects which may be overlapped with the Project.

6. Mozambican side ensure to complete the process of customs clearance of a part of satellite imageries provided under the Forest Preservation Programme of Japanese Grant Aid for Environment and Climate Change (hereinafter referred to as "the Programme") and express to consider the proposal of construction of the REDD+ Information Platform Centre as a possible plan to use remaining budget of the Programme. The Team considered the necessity of facility and office space like the Center to sustainably and effectively operate the forest resources information platform to be established by the Project

7. Japanese side expressed the appreciation to Mozambique side for utilizing the equipment and vehicles provided by the Programme and securing counter budget of year 2014, which would be used for the implementation of activities in the Project.

8. Mozambican side explained the sending letter to SPFFB (Provincial Service of Forest and Wildlife) from department of planning in DNTF mentioning the necessity of acquisition of budget in provincial level as well for the Project implementation.

9. Mozambican side proposed to have the regular meeting for the discussion of the Project implementation with other concerned organization such as Ministry for the Coordination of Environment Affairs (MICOA) and National Centre of Cartography and Remote Sensing (CENACARTA). DNTF will take an initiative for holding the meeting.

10. It was explained about current status of the work on Strategic Environmental and Social Assessment (SESA) under Forest Carbon Partnership Facility (FCPF) and benefit sharing based in diploma 93/2005, which should be respected based on the experience that DNTF has after 10 years of implementation.

Attached Document -2

1. Agenda of the JCC meeting on 9th May 2014

Venue: Meeting room of DNTF

Time	Contents	Responsible by
9:00 – 9:10	Opening announcement and the brief introduction of JCC	National Director of DNTF
9:10 – 9:20	Opening remarks from Mozambique side	Permanent Secretary of MINAG
9:20 – 9:30	Opening remarks from Japanese side	Chief Representative, JICA office
9:30 – 10:00	Presentation : - Results and outputs of project activities in 1st year	Director of DIRN - Joaquim Macuacua,
10:00 – 10:20	Discussion; Q/A	Permanent Secretary of MINAG
10:20 – 11:20	Presentation : - Implementation plan of project activities in 2nd year	JICA Study Team - Kazuhisa Kato
11:20 – 11:40	Discussion; Q/A	Permanent Secretary of MINAG
11:40 – 11:50	Closing remarks	Permanent Secretary of MINAG

* The JCC meeting was initially planned to be conducted by Permanent Secretary of MINAG, but due to overlapping of the agenda of the Permanent Secretary the meeting was conducted by National Director of Land and Forests.

2. List of the participants of the meeting.

National Directorate of Land and Forests (DNTF)

Mr. Simão Pedro Santos Joaquim	National Director
Mr. Darlindo Pechisso	Head of the Forest Department
Ms. Olivia S.Silva Amosse	Head of the Law Enforcement Department
Mr. Salvador Jossias	Head of the Surveying Department
Mr. Emilio Guirrugo	Head of the Administration and Finances Department
Mr. JacintoTualufo	Head of the Cadastral Department
Ms. Teresa Nube	Head of the community Management Division
Mr. Vitoriano Taiela	Head of the Human Resources Division
Mr. Joaquim Macuacua	Head of the Natural Resources Inventory Department (DIRN)
Mr. Isaac omar	DIRN Technician

Mr. Castelo Banze	DIRN Technician
Ms. Halima Nequice	Planning Technician

National Centre of Cartography and Remote Sensing (CENACARTA)

Mr. Jose Guembo	CENACARTA Director

Ministry for the Coordination of Environment Affairs (MICOA)

Ms. Paula Panguene	Duputy National Director, DNGA

Embassy of Japan in Mozambique

Mr. Itsuroh ABE	Coordinator for Economic Cooperation

Japan International Cooperation Agency

Mr. Jun WATANABE	Advisor, Forest and Nature Conservation Division2
	Global Environment Department, JICA HQs
Mr. Katsuyoshi Sudo	Resident Representative, Mozambique Office
Ms. Megumi Tsukizoe	Representative, Mozambique Office
Ms. Yasuko INOUE	JICA Expert, Advisor for strengthening forest management, DNTF

The Team

Mr. Kazuhisa KATO	Leader/REDD+ (1)
Mr. Masaki KAWAI	Remote Sensing (1)
Mr. Daisuke FUKUCHI	Coordinator/Forest Inventory (2)
Ms. Sanae TANABE	Interpreter

MINUTES OF MEETING
ON
THE JOINT COORDINATING COMMITTEE
FOR
THE PROJECT
FOR
"THE ESTABLISHMENT OF SUSTAINABLE FOREST RESOURCE INFORMATION PLATFORM FOR MONITORING REDD+"
IN THE REPUBLIC OF MOZAMBIQUE

Pursuant to the objectives of the Record of Discussion (R/D) for the Project for "The Establishment of Sustainable Forest Resource Information Platform for Monitoring REDD+" in the Republic of Mozambique (hereinafter referred to as "the Project"), agreed on October 12th, 2012 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Agriculture, the third Joint Coordinating Committee (hereinafter referred to as "the JCC") was held on 12th May, 2015.

The main issues discussed among the National Directorate of Land and Forests (hereinafter referred to as "DNTF"), JICA Mozambique office and the JICA project team (hereinafter referred to as "the Team") are shown in the document attached hereto.

Maputo
12th May, 2015

Mr. Simão Pedro Santos Joaquim
National Director
National Directorate of Land and Forests
Ministry of Land, Environment and
Rural Development

Mr. Kazuhisa KATO
Team Leader of the Project
Japan International Cooperation Agency

Witnessed by

Ms. Chiharu Morita
Deputy Resident Representative
Japan International Cooperation Agency
Mozambique Office

Attached Document -1

The objective of the meeting was to present the report of the second year's activities of the Project, the implementation plan for the third year, and how to utilize the Project's outputs for implementation of REDD+ and sustainable forest management in Mozambique.

DNTF explained results and outputs of the implementation of project activities of the second year as well as outline of project structure, and the Team explained the plan of implementation of project activities for the third year including changing points of fundamental concepts from technical aspects, and utilization of the Project's outputs for implementation of REDD+ and sustainable forest management in Mozambique. The Mozambican and Japanese sides discussed with each other the contents of the project implementation as listed in the following items.

1. The JCC acknowledged the progress of the Project made in the second year and agreed the project implementation plan for the third year without any changes from the proposed plan. In addition, the JCC confirmed that the Team would prepare and submit the Project Implementation Plan for the third year according to the agreement of the JCC.

2. The JCC agreed on the activities to be carried out by the Project within its implementation period and by the Mozambican side within and after the implementation period of the Project based on the Project's outputs for implementation of REDD+ and sustainable forest management in Mozambique. Based on this agreement, the Project will develop FREL/FRL at the sub-national level in Gaza and Cabo Delgado Provinces and will conduct forest inventory in Gaza and Cabo Delgado Provinces. The detail is shown in the Attached Document-3.

3. The JCC confirmed that the Project has been providing necessary technical supports for establishing the solid basis for the implementation of REDD+ so that Mozambique would become eligible to obtain result-based payment in the future from any potential funds (e.g. GCF).

4. The JCC suggested that coordination among UT-REDD, World Bank and the Project be promoted through the frequent communication for the REDD+ implementation (e.g. securing consistency of methodology of FREL/FRL setting and forest inventory, and avoiding overlapping of capacity building on MRV).

5. The JCC confirmed that DNTF would continue the effort to assure appropriate personnel arrangement not only within the Project period but also after the Project period in order to utilize the outputs of the Project in response to the request made by the Team for assigning sufficient number of counterpart staff.

6. The JCC ensured that budgetary issue should be dealt with appropriately by the Mozambican side on the basis of a letter to be submitted by the Team, requesting for providing necessary budget whenever the additional budget for the implementation of Project is needed.

7. The JCC ensured that electricity issue in the office including the server room would be resolved by the DNTF through ordering the repairmen to EDM. In addition, the JCC confirmed that it should be also considered by Mozambican side to establish data backup facility as security system for avoiding data loss in the server provided by the Forest Preservation Programme of Japanese Grant Aid for Environment and Climate Change. For addressing this issue, a possibility of moving the office to a new place was suggested by DNTF.

8. The JCC underscored that the influence of forest definition issue is significant in case the rate of minimum canopy cover is altered from 10 % to 30 % as is considered through the study by FCPF. For instance, the forest area in Gaza Province delineated by Hansen, Global Forest Watch, would decrease by more than 90 % (from 5,500,000 ha to 500,000 ha approximately) by this alteration. As a result, disordered exploitation of precious tree species which are usually found in the forests with less than 30 % canopy cover might be led. In addition, it should be kept in mind that the Project already produced the forest cover maps of Gaza and Cabo Delgado Provinces by adopting 10 % as minimum canopy cover in accordance with the forest definition of AIFM.

Attached Document -2

1. Agenda of the JCC meeting on 12th May 2015

Venue: Meeting room of DNTF

Time	Contents	Responsible by
9:00 – 9:10	Opening announcement and the brief introduction of JCC	National Director of DNTF
9:10 – 9:20	Opening remarks from Mozambique side	National Director of DNTF
9:20 – 9:30	Opening remarks from Japanese side	Deputy Resident Representative, JICA office
9:30 – 9:50	Presentation : - Results and outputs of project activities in 2nd year	DIRN - Isaac Omar
9:50 – 10:10	Discussion; Q/A	National Director of DNTF
10:10 – 11:00	Presentation : - Implementation plan of project activities in 3rd year and the future direction of project	JICA Study Team - Kazuhisa Kato
11:00 – 11:50	Discussion; Q/A	National Director of DNTF
11:50 – 12:00	Closing remarks	National Director of DNTF

2. List of the participants of the meeting.

National Directorate of Land and Forests (DNTF)

Mr. Simão Pedro Santos Joaquim	National Director
Mr. Darlindo Pechisso	Head of the Forest Department (FD)
Ms. Yolanda Gonçalves	Head of the Planning Department
Mr. Hilário Akissa	FD Technician
Ms. Carmen Luisa	Wildlife Department Technician
Mr. Cláudio Afonso	Law Enforcement Department Technician
Mr. Isaac omar	Natural Resources Inventory Department (DIRN) Technician
Mr. Pachis Mugas	DIRN Technician
Mr. Danilo Cunhete	DIRN Technician

National Centre of Cartography and Remote Sensing (CENACARTA)

Ms. Belmira Saeze	CENACARTA

Ministry of the Land, Environment and Rural Development (MITADER)

Ms. Marcos Sapaterro	Duputy National Director, DNGA
Mr. Aristides B. Muhate	UT-REDD
Mr. Mariano Cenamo	UT-REDD

Doners

Mr. Madyo Couto	World Bank

Japan International Cooperation Agency

Mr. Hiroki Miyazono	Senior Advisor, JICA HQs
Mr. Taichi Morinaga	Special Advisor, Natural Environment Team 2, Forestry and Natural Conservation Group, Global Environment Department, JICA HQs
Ms. Chiharu Morita	Deputy Resident Representative, Mozambique Office
Ms. Megumi Tsukizoe	Representative, Mozambique Office
Mr. Stelio Massuque	Program Officer, Mozambique Office
Mr. Takuya Homma	JICA Expert, Advisor for strengthening forest management, DNTF

The Team

Mr. Kazuhisa KATO	Leader/REDD+ (1)
Mr. Masaki KAWAI	Remote Sensing (1)
Mr. Daisuke FUKUCHI	Coordinator/Forest Inventory (2)
Ms. Sanae TANABE	Interpreter

MINUTES OF MEETING
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Pursuant to the objectives of the Record of Discussion (R/D) for the Project for "The Establishment of Sustainable Forest Resource Information Platform for Monitoring REDD+" in the Republic of Mozambique (hereinafter referred to as "the Project"), agreed on October 12th, 2012 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Agriculture, the fourth Joint Coordinating Committee (hereinafter referred to as "the JCC") was held on 15th April, 2016.

The main issues discussed among the National Directorate of Forests (hereinafter referred to as "DINAF"), JICA and the JICA project team (hereinafter referred to as "the Team") are shown in the document attached hereto.

Maputo
15th April, 2016

Xavier Sakambuera Sailors

Mr. Xavier Sakambuera Sailors
National Director
National Directorate of Forests,
Ministry of Land, Environment and
Rural Development

加藤和久

Mr. Kazuhisa KATO
Team Leader of the Project
Japan International Cooperation Agency

Witnessed by

須藤勝義

Mr. Katsuyoshi SUDO
Resident Representative
Japan International Cooperation Agency
Mozambique Office

Attached Document -1

The objective of the meeting was to present and approve the report of the third year's activities of the Project, and the implementation plan for the fourth year.

DINAF explained results and outputs of the implementation of project activities in the third year as well as outline of project structure, and the Team explained the plan of implementation of project activities for the fourth year including changing points of fundamental concepts from technical and management aspects. The Mozambican and Japanese sides discussed with each other the contents of the project implementation as listed in the following items.

1. The JCC acknowledged the progress of the Project made in the third year and agreed the project implementation plan for the fourth year without any changes from the proposed plan. In addition, the JCC confirmed that the Team would prepare and submit the Project Implementation Plan for the fourth year according to the agreement of the JCC.

2. The JCC emphasized that outputs such as the platform established by the Project should be properly utilized having coordination among other related donors and national organizations in case same kind of the outputs are made.

3. The JCC confirmed that JICA suggested DINAF to consider methods on deforestation monitoring that could be taken especially after end of K&C Phase 4, for instance, use of Tropical Forests Early Warning System of JICA – JAXA cooperation by use of ALOS2 images with 50 m resolution, radar analysis by free ALOS2 images with 25 m resolution, and radar analysis by purchased ALOS2 images with 6.25m, taking into the account advantage and disadvantage of each method.

4. The JCC confirmed that JICA suggested DINAF to consider method of benefit distribution system (BDS) including method to incorporate it into the platform considering how benefit such as credit and/or fund should be distributed to the stakeholder of REDD+ implementation after obtaining results-based payment.

5. The JCC confirmed that DINAF will prepare a proposal for next project based on the outputs of the Project.

6. The JCC confirmed that DINAF assured appropriate personnel arrangement including method of a personnel reshuffle from provincial level in response to the request made by the Team for assigning sufficient number of counterpart staff as soon as possible.

7. The JCC confirmed that JICA requested to clarify necessary number of personnel and scale of budget for the operation to utilize the outputs of the Project which would be handed over to the Mozambican side after end of the Project.

8. The JCC ensured that condition in the server room would be resolved and improved by the DINAF through ordering the repair of air-conditioner.

Attached Document -2

Agenda of the JCC meeting on 15th April 2016
Venue: Meeting room of DINAF

Time	Contents	Person in charge
08:50 – 09:00	Registry	DIRF
09:00 – 09:10	Self-introduction	All
09:10 – 09:20	Speech	JICA-MOZ - Resident Representative
09:20 – 09:30	Speech	JICA-mission leader
09:30 – 09:40	Speech	DINAF National Director
09:40 – 10:00	Results of the Project in the 3rd year	DIRF Cheef - Alima Issufo
10:00 – 10:20	Q&A and Debate	All
10:20 – 11:10	Implementation plan of project activities in the 4th year	JICA team leader – Kazuhisa Kato
11:10 – 11:30	Q&A and Debate	All
11:30 – 11:40	Final Considerations	DINAF National Director

2. List of the participants of the meeting.

National Directorate of Land and Forests (DINAF)

Mr. Xavier Sakambuera Sailors	National Director
Ms. Teresa Nube	Chief of Department of Forest Resources Community Management
Mr. Hilario Aquissa	Technician - Department of Forest Resources Community Management
Mr. Julião Cuambe	Technician - the Forest Department
Mr. Patricio Pembisse	Technician - Law Enforcement Department
Ms. Alima Issufo Taquidir	Head of the Forest Resources Inventory Department (DIRF)
Mr. Joaquim Macuácua	DIRF Technician
Mr. Isaac omar	DIRF Technician
Mr. Renato Timane	DIRF Technician
Mr. Danilo Cunhete	DIRF Technician
Ms. Milda Maússe	DIRF- Technician
Ms. Sara Tembe	DIRF - Secretary

National Centre of Cartography and Remote Sensing (CENACARTA)

Ms. Belmira Saeze	CENACARTA

Japan International Cooperation Agency

Mr. Kenichi Shishido	Deputy Director General, and Group Director for Forestry and Nature

	Conservation, Global Environment Department, JICA HQs
Ms. Mari Miura	Deputy Director, Natural Environment Team 1&2, Forestry and Natural Conservation Group, Global Environment Department, JICA HQs
Mr. Katsuyoshi Sudo	Resident Representative, Mozambique Office
Ms. Chiharu Morita	Deputy Resident Representative, Mozambique Office
Ms. Makiko Inamori	Project Formulation Advisor, Mozambique Office
Mr. Stelio Massuque	Program Officer, Mozambique Office
Mr. Takuya Homma	JICA Expert, Advisor for strengthening forest management, DINAF

The Team

Mr. Kazuhisa Kato	Leader/REDD+ (1)
Ms. Sachiko Takinaga	Coordinator/Forest Inventory (2)
Ms. Sanae Tanabe	Interpreter
Mr. David Penicela	Project Local Staff

MINUTES OF MEETING
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Pursuant to the objectives of the Record of Discussion (R/D) for the Project for "The Establishment of Sustainable Forest Resource Information Platform for Monitoring REDD+" in the Republic of Mozambique (hereinafter referred to as "the Project"), agreed on October 12th, 2012 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Agriculture, the fifth Joint Coordinating Committee (hereinafter referred to as "the JCC") was held on 5th May, 2017.

The main issues discussed among the National Directorate of Forests (hereinafter referred to as "DINAF"), JICA and the JICA project team (hereinafter referred to as "the Team") are shown in the document attached hereto.

Maputo
5th May, 2017

Mr. Xavier Sakambuera Sailors
National Director
National Directorate of Forests,
Ministry of Land, Environment and
Rural Development

Mr. Kazuhisa KATO
Team Leader of the Project
Japan International Cooperation Agency

Witnessed by

Mr. Katsuyoshi SUDO
Resident Representative
Japan International Cooperation Agency
Mozambique Office

Attached Document -1

The objective of the meeting was to present and approve the report of the fourth year's activities of the Project, and the implementation plan for the fifth year.

DINAF explained results and outputs of the implementation of project activities in the fourth year as well as outline of project structure, and the Team explained the plan of implementation of project activities for the fifth year including changing points of fundamental concepts from technical and management aspects. The Mozambican and Japanese sides discussed with each other the contents of the project implementation as listed in the following items.

1. The JCC acknowledged the progress of the Project made in the fourth year and agreed the project implementation plan for the fifth year without any changes from the proposed plan. In addition, the JCC confirmed that the Team would prepare and submit the Project Implementation Plan for the fifth year according to the agreement of the JCC.

2. The JCC confirmed that it is significant for DINAF and REDD+ Technical Unit (hereinafter referred to as "UT-REDD+") to make closer communication for the cooperation of REDD+ implementation by some measures such as holding periodical meetings.

3. The JCC acknowledged that UT-REDD+ would make arrangement to let staff of MRV unit in UT-REDD+ participate in training course including OJT for preparation of forest cover/land use map by detecting land cover change to be organized by the Project.

4. The JCC acknowledged that UT-REDD+ agreed to prepare a sole NFMS document for the country and would cooperate and coordinate with DINAF and the Project for the preparation of document.

5. The JCC confirmed that and DINAF would cooperate for National Directorate of Environment (DINAB) to prepare Biennial Update Report (BUR) through properly providing DINAB with data in the forest resource information platform established by the Project.

6. The JCC confirmed that contents in the minutes of meeting exchanged between MITADER and JICA on 23rd March 2017 would be fulfilled through ordering necessary actions.

Attached Document -2

Agenda of the JCC meeting on 5th May 2017
Venue: Meeting room of DINAF

Time	Contents		Moderator
08:50 – 09:00	Registry		Administration
09:00 – 09:20	Speech	DINAF National Director	National Director
09:20 – 09:30	Speech	JICA-MOZAMBIQUE	
09:30 – 10:00	Results of the Project in the 4th year	DIRF Joaquim Macuacua	National Director
10:00 – 10:20	Q&A and Debate	All	
10:20 – 11:10	Implementation plan of project activities in the 5th year	JICA team leader – Kazuhisa Kato	
11:10 – 12:00	Q&A and Debate	All	
12:00 – 12:15	Final Considerations	DINAF National Director	
12:15 – 12:30	Coffe Time		

2. List of the participants of the meeting.

National Directorate of Forests (DINAF)

Mr. Xavier Sakambuera Sailors	National Director
Ms. Teresa Nube	Head of Forest Resources Community Management Department
Mr. Julião Cuambe	Head of the Forest Resources Inventory Department (DIRF)
Mr. Joaquim Macuácua	Chief of Mapping and Data Management Division in DIRF
Mr. Renato Timane	Chief of Inventory and Management Plan Division in DIRF
Mr. Baraca R. A.	Chief of Monitoring and Evaluation Division
Ms. Virginia Marta Langa	Chief of General Support Division
Mr. Paulo Miguel Feniasse	Chief of Forest Industry Division
Mr. Osvaldo Manso	Chief of Natural Forest Division
Mr. Darlindo Pechisso	DINAF Technician
Mr. Isaac omar	DIRF Technician
Mr. Pachis Mugas	DIRF Technician
Mr. Obasanjo Dembele	DIRF Technician
Ms. Alice Mutemba	DIRF Technician
Ms. Sara Tembe	DIRF - Secretary

National Directorate of Environment (DINAB)

Ms. Paula Panguene	Technician

National Directorate of Planning and Cooperation (DPC)

Ms. Rosa Cesaltina	Technician

National Centre of Cartography and Remote Sensing (CENACARTA)

Mr. Jose Luis Quembo	Director

National Fund for Sustainable Development (FNDS)

Mr. Aristides Muhate	Technician

Japan International Cooperation Agency

Mr. Katsuyoshi Sudo	Resident Representative, Mozambique Office
Ms. Hideaki Aoki	Deputy Resident Representative, Mozambique Office
Ms. Makiko Inamori	Project Formulation Advisor, Mozambique Office
Mr. Stelio Massuque	Program Officer, Mozambique Office

The Team

Mr. Kazuhisa Kato	Leader/REDD+ (1)
Mr. Masaki Kawai	Forest Remote Sending (1)
Mr. Keita Shimaoka	Coordinator/Forest Inventory (2)
Ms. Sanae Tanabe	Interpreter
Mr. David Penicela	Project Local Staff

MINUTES OF MEETING
ON
THE JOINT COORDINATION COMMITTEE
FOR
"THE PROJECT FOR THE ESTABLISHMENT OF SUSTAINABLE FOREST RESOURCE INFORMATION PLATFORM FOR MONITORING REDD+"
IN THE REPUBLIC OF MOZAMBIQUE

Pursuant to the objectives of the Record of Discussion (R/D) for "The Project for the Establishment of Sustainable Forest Resource Information Platform for Monitoring REDD+" in the Republic of Mozambique (hereinafter referred to as "the Project"), agreed on October 12th, 2012 between the Ministry of Agriculture and Japan International Cooperation Agency (hereinafter referred to as "JICA"), the sixth and final Joint Coordination Committee (hereinafter referred to as "the JCC") was held on 9th March, 2018.

The main issues discussed among National Directorate of Forests (hereinafter referred to as "DINAF") in Ministry of Land, Environment and Rural Development (hereinafter referred to as "MITADER") of Government of Mozambique, JICA and the JICA project team (hereinafter referred to as "the Team") are shown in the document attached hereto.

Maputo
13th March, 2018

Mr. Xavier Sakambuera Sailors
National Director
National Directorate of Forests,
Ministry of Land, Environment and
Rural Development

Mr. Kazuhisa KATO
Team Leader of the Project
Japan International Cooperation Agency

Witnessed by

Mr. Hiroaki ENDO
Resident Representative
Japan International Cooperation Agency
Mozambique Office

Attached Document -1

The objective of the meeting was to report key outputs of the Project for five years and to explain and discuss how to utilize the outputs after the Project termination.

DINAF explained key outputs of the Project for five years, and the Team proposed how to utilize the outputs after the Project termination and made some recommendation for the sustainability. The Mozambican and Japanese sides discussed each other the issues for the end of the Project as listed in the following items.

1. The JCC accepted key outputs of the Project for five years such as the Forest Resources Information Platform (hereinafter referred to as "the FRIP") as database system, the forest cover/land use maps in Gaza and Cabo Delgado provinces including the maps in the reference years, results of radar analysis for deforestation monitoring, results of forest inventory in Gaza and Cabo Delgado provinces, FRLs set for Gaza and Cabo Delgado provinces, and developing allometric equation for Mopane forest. The JCC also acknowledged that the outputs of the Project have already been approved by the technical committee of MITADER and would be approved by the consultative committee of MITADER.

2. The JCC acknowledged that DINAF received 23 copies of the Draft Final Report in Portuguese of the Project, and agreed that DINAF would make comments on the report by the end of March for preparation of the Final Report. In addition, the JCC agreed that the Final Report would be opened to the public.

3. The JCC ensured that the outputs of the Project would be utilized properly based on the discussion on how to utilize the outputs after the end of the Project mentioned in the Draft Final Report.

4. The JCC confirmed that it is important to update and improve the FRIP through the management system of FRIP explained in this JCC meeting. The JCC also confirmed the importance of the action plan for utilizing the FRIP including roadmaps of improving functions of the FRIP and uploading information and data into the FRIP mentioned in the Draft Final Report.

5. The JCC requested DIRF to make a list of focal-points in each department of DINAF and other organizations such as National Sustainable Development Fund (hereinafter referred to as "FNDS") and National Directorate of Environment (DINAB) for utilization of the outputs especially the FRIP.

6. The JCC confirmed that DINAF and FNDS would prepare a sole document on National Forest Monitoring System (hereinafter referred to as "NFMS") for the country through cooperation and coordination referring the draft NFMS document prepared by the Project.

Attached Document -2

Agenda of the JCC meeting on 9th March 2018
Venue: Meeting room of DINAF

Time	Contents		Moderator
09:00 – 09:10	Speech	DINAF National Director	DINAF National Director
09:10 – 09:20	Speech	Embassy of Japan	
09:20 – 09:30	Speech	JICA-MOZAMBIQUE	
09:30 – 10:10	Outputs of the project for five years	DIRF Cheef Eng.Julião Cuambe	DINAF National Director
10:10 – 10:30	Q&A and Debate	All	
10:30 – 11:10	How to utilize the project output after the project, and some recommendations	JICA team leader – Kazuhisa Kato	
11:10 – 12:00	Q&A and Debate	All	
12:00 – 12:30	Final Considerations	DNAF National Director	

2. List of the participants of the meeting.

National Directorate of Forests (DINAF)

Mr. Xavier Sakambuera Sailors	National Director
Mr. Julião Cuambe	Head of the Forest Resources Inventory Department (DIRF)
Mr. Joaquim Macuácua	Chief of Mapping and Data Management Division in DIRF
Mr. Hilario Akissa	DINAF Technician
Mr. Claudio Afonso	DINAF Technician
Ms. Josefina Assane	DINAF Technician
Mr. Isaac omar	DIRF Technician
Mr. Pachis Mugas	DIRF Technician
Mr. Obasanjo Dembele	DIRF Technician
Ms. Alice Mutemba	DIRF Technician
Ms. Milda Mausse	DIRF Technician
Ms. Sara Tembe	DIRF Secretary

National Directorate of Environment (DINAB)

Ms. Paula Panguene	Technician

加藤和久

National Administration of Conservation Areas (ANAC)

Mr. Nunes Mazivile	Technician

National Directorate of Planning and Cooperation (DPC)

Ms. Alexia Mutisse	Technician

National Centre of Cartography and Remote Sensing (CENACARTA)

Mr. Antonio Miambo	Technician

National Fund for Sustainable Development (FNDS)

Mr. Jose Mani Samuel	Technician ICT
Mr. Alismo Herculano Nhanengue	Technician MRV
Mr. Delfio Gomes Mapsanganha	Technician MRV

Embassy of Japan

Mr.Yasuma Takao	Researcher / Advisor, Embassy of Japan

Japan International Cooperation Agency

Ms. Hide~~aki~~ take Aoki	Senior Representative, Mozambique Office
Ms. Makiko Inamori	Project Formulation Advisor, Mozambique Office

The Team

Mr. Kazuhisa Kato	Leader/REDD+ (1)
Mr. Keita Shimaoka	Coordinator/Forest Inventory (2)
Ms. Sanae Tanabe	Interpreter

Appendix14 Schedule and Location of GBFM survey

1) Pre-GBFM in Cabo Delgado in the beginning of June 2015

ALOS2 images taken on September 2014 and November 2014(Montepuez district) and October 2014 and December 2014(Ancuabe) were analyzed by above-mentioned method. Field survey was implemented for the detected deforestation area. Although field survey has to be conducted as soon as possible after taking satellite images, this survey was implemented 6 months later. Thus, this is regarded as pre-GBFM. Table 1 shows the schedule of this Cabo Delgado Pre-GBFM survey.

table 1 Schedule of survey in Cabo Delgado in June 2015

Date (Day of the week)	Survey Area	Survey Points
2nd June(Tue)	Cabo Delgado Ancuabe district	Point1~5（Total 5 points）
3rd June(Wed)	Cabo Delgado Montepuez district	Point6~12（Total 7 points）
4th June(Thu)	Cabo Delgado Montepuez district	Point 13~19（Total 7 point）

The following figure shows the survey area.

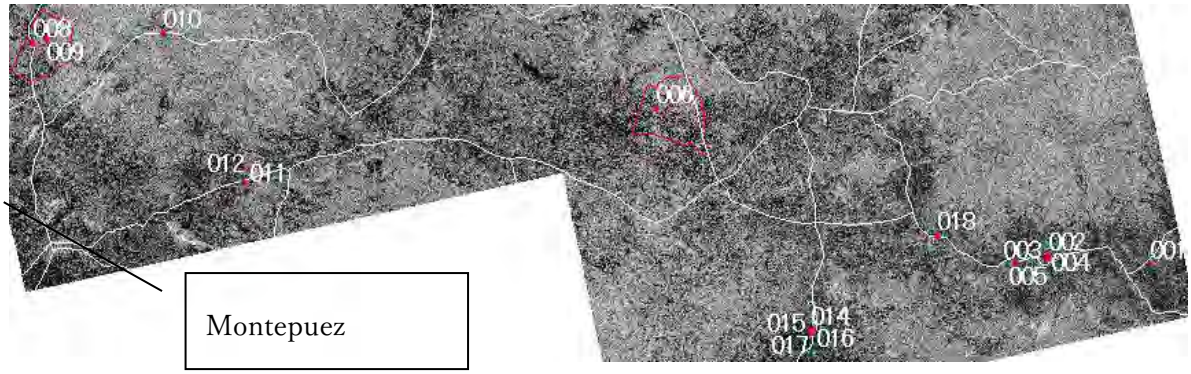

Figure 1 Location of survey area and points in Cabo Delgado in June 2015

2) GBFM in Cabo Delgado and Zambezia Provinces in late August and early September 2015

After the first observation in FY2015 (from late June to late July, 2015), ALOS-2 imagery were obtained, and deforestation areas were detected by visual interpretation. In order to verify the interpretation results, field surveys were implemented under the GBFM. These field surveys were conducted in Cabo Delgado Province, a target province of this Project, and in Zambezia Province where deforestations heavily occurred in recent years. The field surveys were not conducted in Gaza Province because no observation was made by ALOS-2 satellite during the period from late June to late July in 2015.

The GBFM survey schedules in Cabo Delgado and Zambezia Provinces are shown in Table 2 and Table 3 respectively.

table 2 Schedule of GBFM GT Survey in Cabo Delgado Province in August, 2015

Date (Day of the week)	Survey Area	Survey Points
August 27, Thursday	Ancuabe District, Cabo Delgado Province	CD001, CD002, CD003 (Total 3 points)
August 28, Friday	Montepuez District, Cabo Delgado Province	CD004, CD005, CD006, CD007, CD008, CD009, CD010, CD011, CD012, CD013, CD014 (Total 11 points)

table 3 Schedule of GBFM GT Survey in Zambezia Province in September, 2015

Date (Day of the week)	Survey Area	Survey Points
September 1, Tuesday	Morrumbala District, Zambezia Province	ZB001, ZB002, ZB003 (Total 3 points)
September 2, Wednesday	Morrumbala District, Zambezia Province	ZB004, ZB005, ZB006, ZB007, ZB008, ZB009 (Total 6 points)
September 3, Thursday	Morrumbala District, Zambezia Province	ZB010, ZB011 (Total 2 points)

Figure 2 and Figure 3 show locations where the field surveys were conducted.

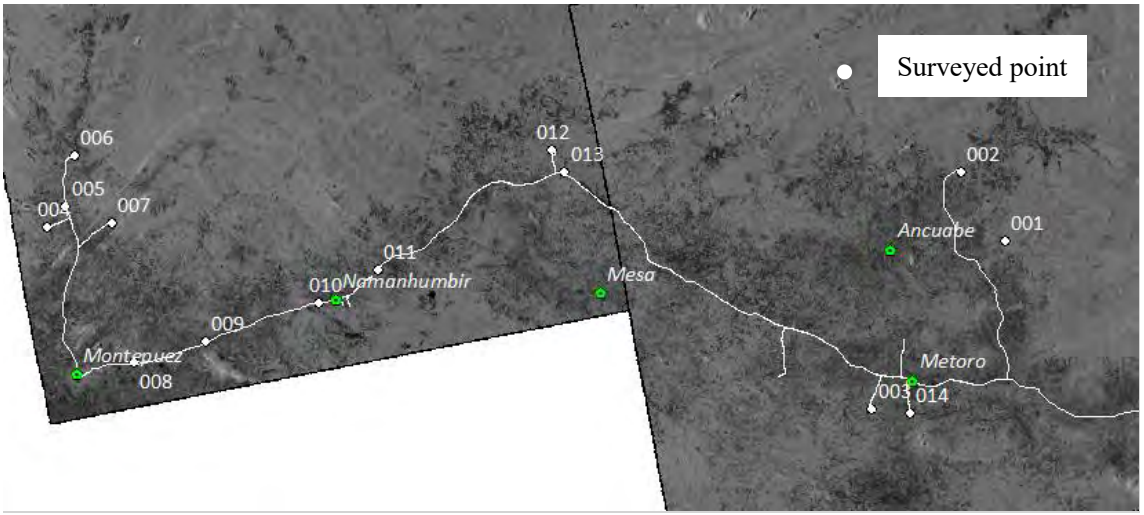

Figure 2 Survey points for the GBFM GT in Cabo Delgado Province

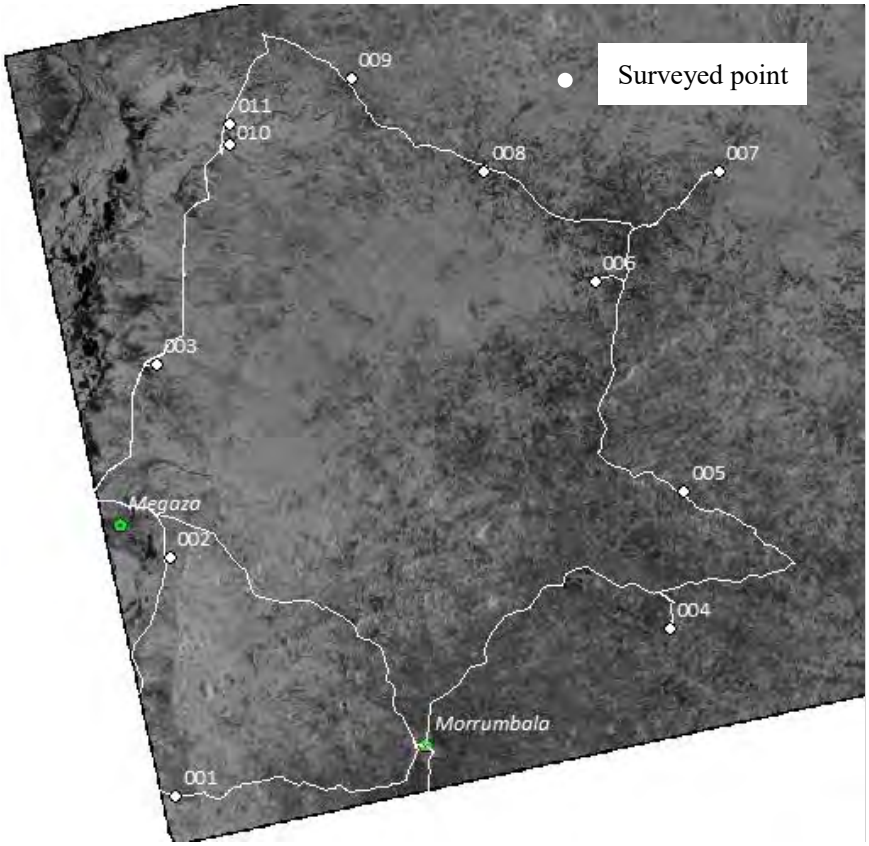

Figure 3 Survey points for the GBFM GT in Zambezia Province

3) GBFM in Gaza province in October 2015

Based on the results of GBFM survey conducted in August and September, the method calculating diminished value of backscatter coefficient (intensity that indicates degree of brightness on the radar satellite imagery), assuming average value of the diminished values as threshold, and detecting deforestation pixels was taken to detect forest deforestation area.

In the GBFM in Gaza province, polygons of place where many pixels of deforestation gather were manually divided and delineated.

Because of limitation of survey durations and difficulty of access due to poor road network, deforestation polygons along roads near Shokwe city were target. The schedule of the survey is shown in Table 4.

table 4 Schedule of the GBFM Survey in Gaza Province in October 2015

Date (Day of the week)	Survey Area	Survey Points
1st October	Guija district in Gaza province	GZ021, GZ017, GZ017Kaway,（Total 3 points）
2nd October	Guija district in Gaza province	GZ035, GZ010, GZ011, GZ009, GZ052, GZ051, GZ047, GZ003（Total 8 points）

Figure 4 shows locations where the field surveys were conducted.

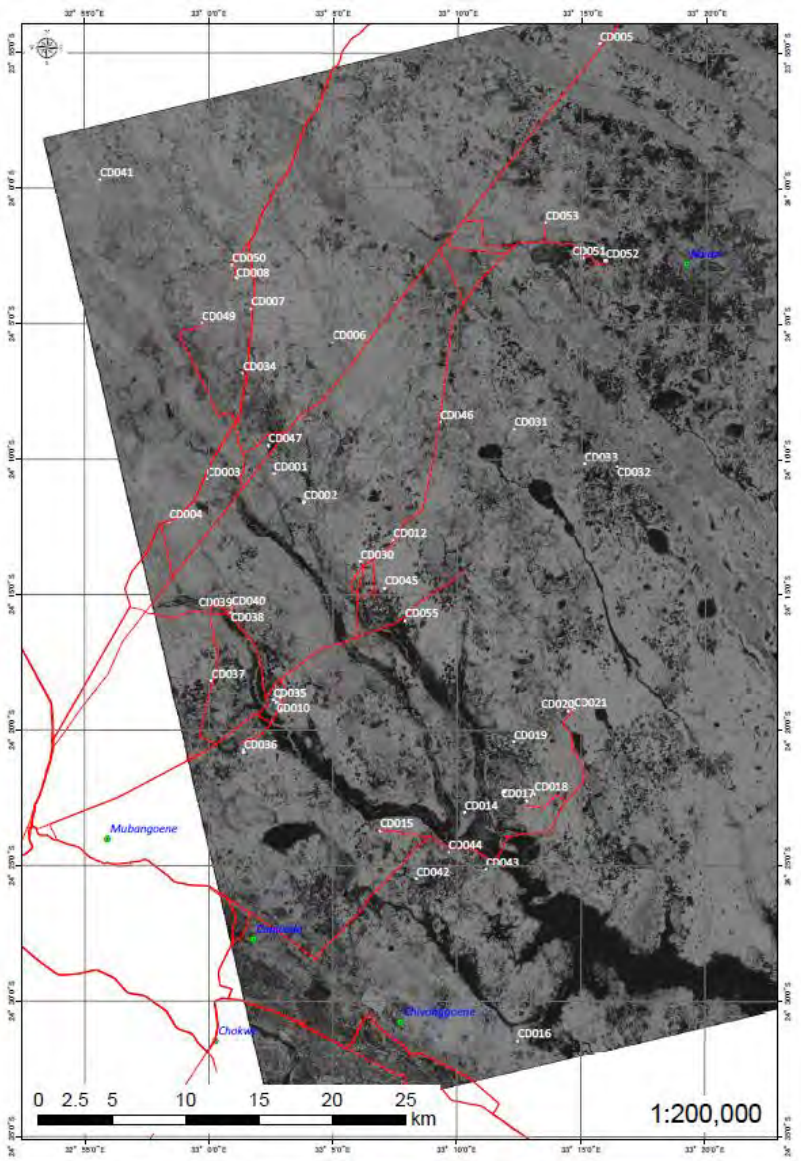

Figure 4 Location map of GBFM survey points in October 2015 in Gaza province (Including points where are out of points surveyed)

4) GBFM in Gaza Province in the middle of November 2015

Because of conducting GBFM in survey points in which the GBFM in early October 2015 in Gaza province could not be conducted, method to detect deforestation area was same way for the GBFM in October. The below table 5 shows the schedule of this Gaza GBFM survey.

table 5 Schedule of survey in Gaza in November 2015

Date (Day of the week)	Survey Area	Survey Points
17th November (Tue)	Gaza Guija district	GZ012, GZ045, GZ046, GZ055（Total 4 points）
18th November (Wed)	Gaza Guija district	GZ001, GZ002, GZ007, GZ037, GZ038, GZ050（Total 6 points）

The following figure shows the survey area.

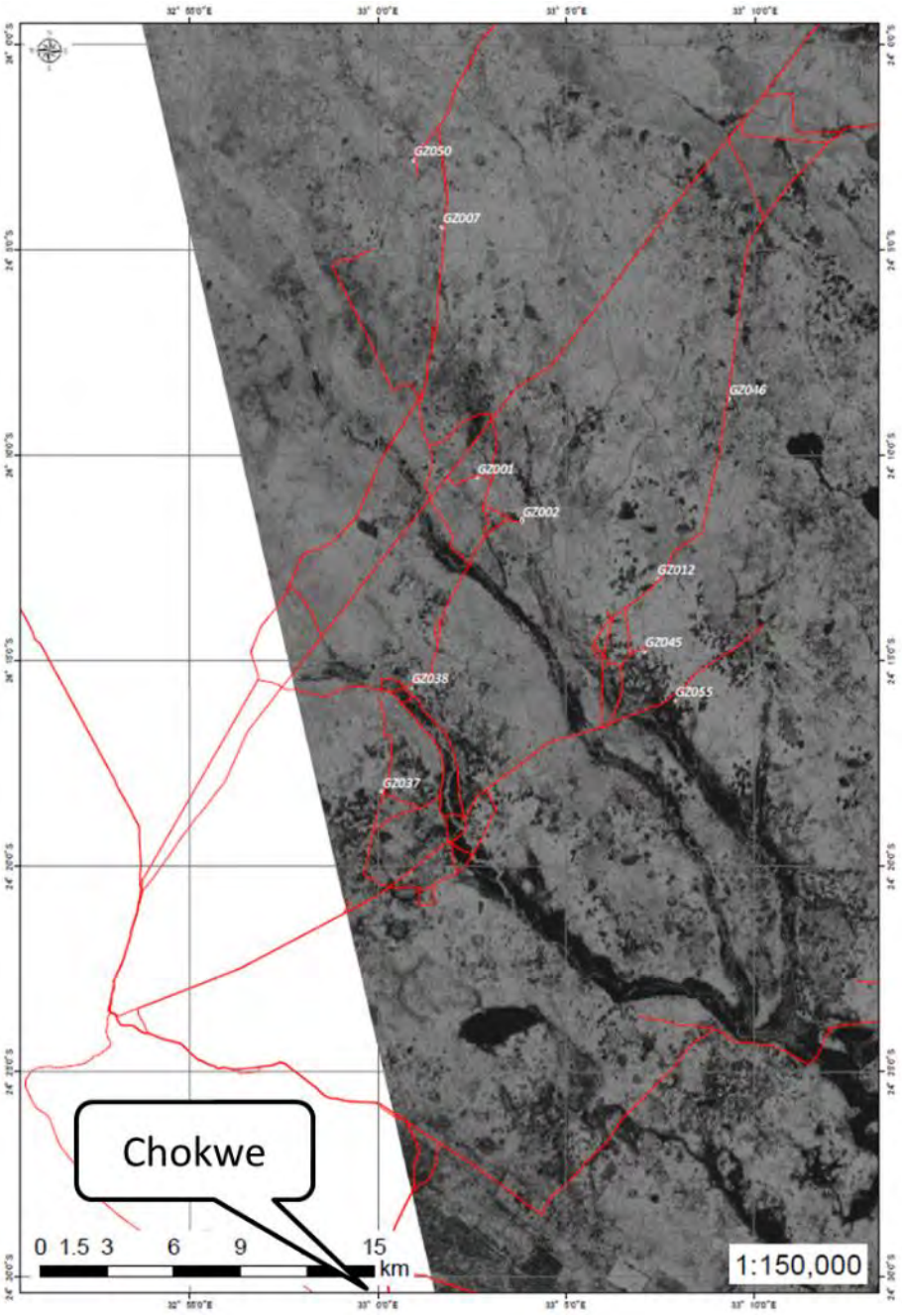

Figure 5 Location of survey area and points in Gaza in the middle of November 2015

5) GBFM in Cabo Delgado Province in the beggining of December 2015

Field survey was implemented in Cabo Delgado.

Reduction value was calculated from backscatter factor of ALO-2 image in order to detect deforestation area based on the survey which was conducted during August and November 2015. Threshold which was calculated as average value was used for extracting deforestation pixel by visual interpretation as reference.

This survey in Cabo Delgado used two kinds of images. Resolution for Palma district is 25m. Another one for Mochimboa is 6.25m. Comparative survey was implemented in overlapped area. Table 6 shows the schedule of survey.

table 6 Schedule of survey in Cabo Delgado in December 2015

Date (Day of the week)	Survey Area	Survey Points
7th December （Mon）	Cabo Delgado Palma District, Mochimboa district	CD-PA-20,23(Total 2 points)
8th December（Tue）	Cabo Delgado Palma District, Mochimboa district	CD-PA-18,37-1,37-2,38,CD-M-21 （Total 5 points）
9th December （Wed）	Cabo Delgado Mochimboa district	CD-M-15,16-1,16-2,16-3,20,25,34,42（Total 8 points）
10th December （Thu）	Cabo Delgado Mochimboa district	CD-M-7,19,32,45-1,45-2(Total 5 points)

The following figure shows the survey area

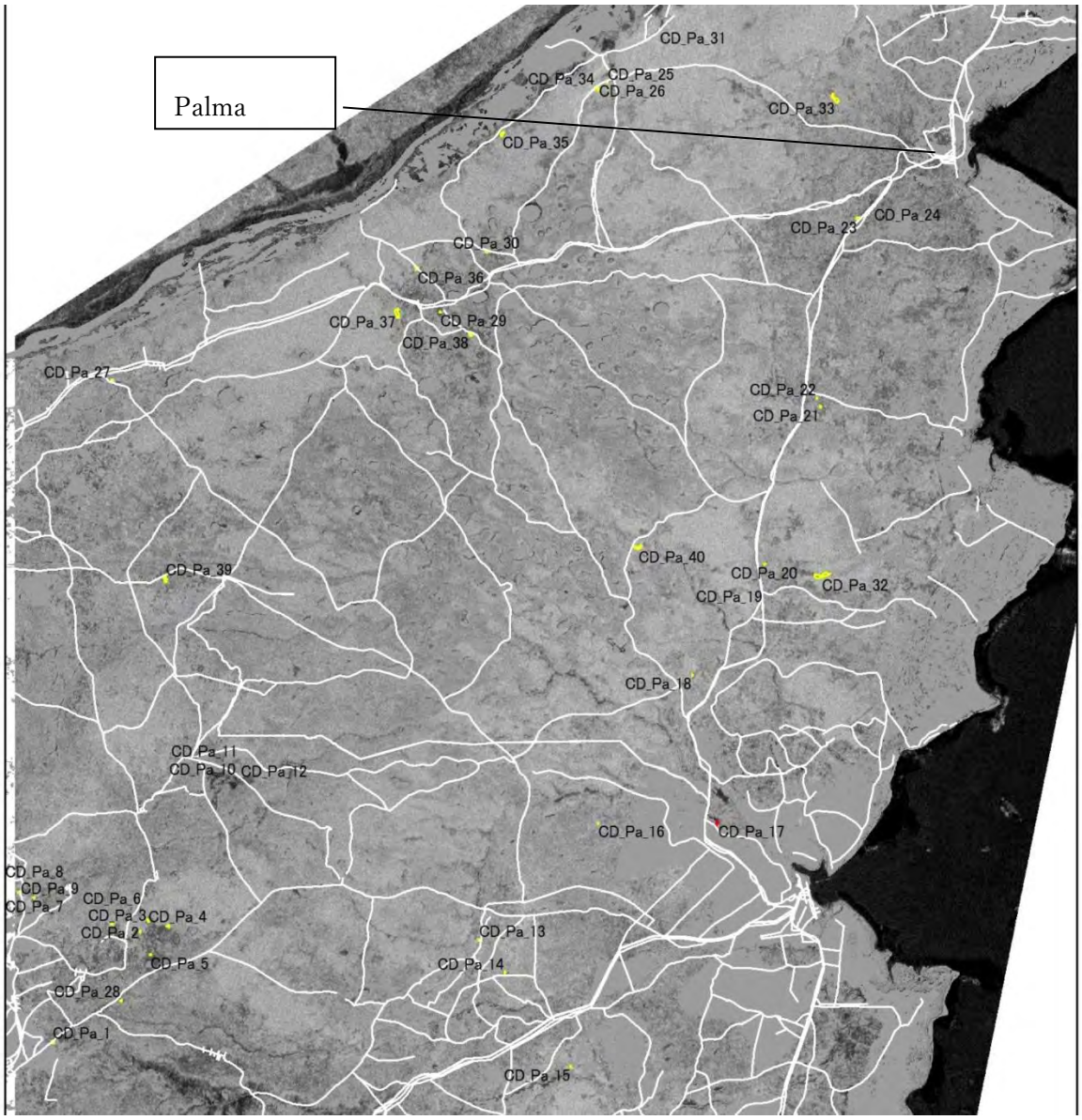

Figure 6 GBFM survey points in Cabo Delgado (Palma) in December 2015

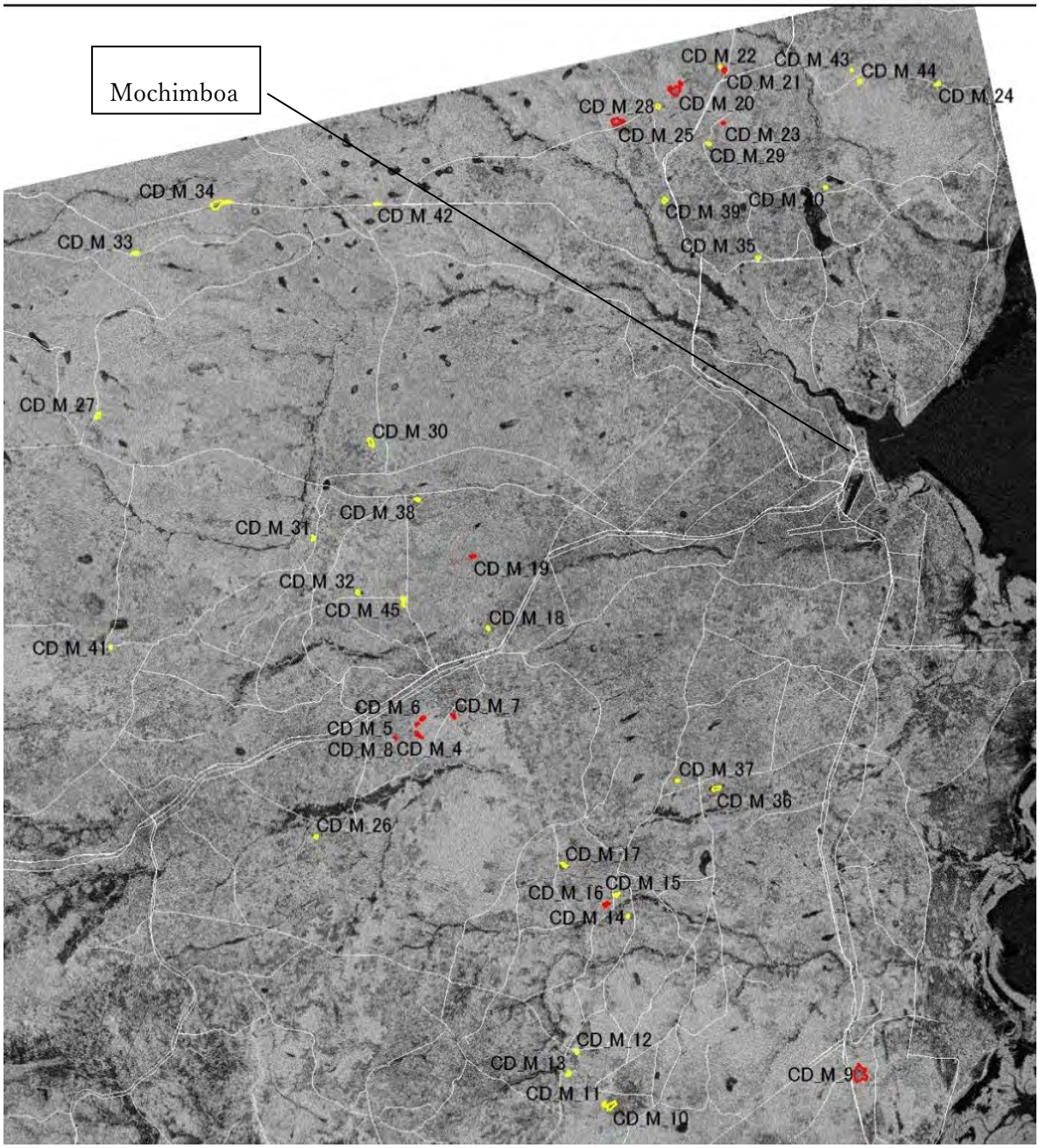

Figure 7 GBFM survey points in Cabo Delgado (Mochimboa) in December 2015

6) GBFM in Manica Prvince in the middle of December 2015

Field survey was implemented in Manica.

The resolutions of ALOS-2 images are 6.25m in Manica. In South area (Chimoio district), Visual interpretation was used for detecting deforestation area. On the other hand, in North area, Reduction value was calculated from backscatter factor of ALO-2 image in order to detect deforestation area based on the survey which was conducted during August and November 2015 was used as threshold in order to extract deforestation pixel.

Table 7 shows the schedule of survey.

table 7 GBFM schedule in Manica in December 2015

Date (Day of the week)	Survey Area	Survey Points
14th December （Mon）	Manica Chimoio district	MC-34-17,18,19,20,21,30,31,35 (Total 8points)
15th December （Tue）	Manica Chimoio district	MC-34-10,11,12,13,14,25 (Total 6 points)
16Th December （Wed）	Manica Chimoio district	MC-37-17,18,19,20,21,22,23,25,Others (Total 9 points)

The following figure shows the survey area.

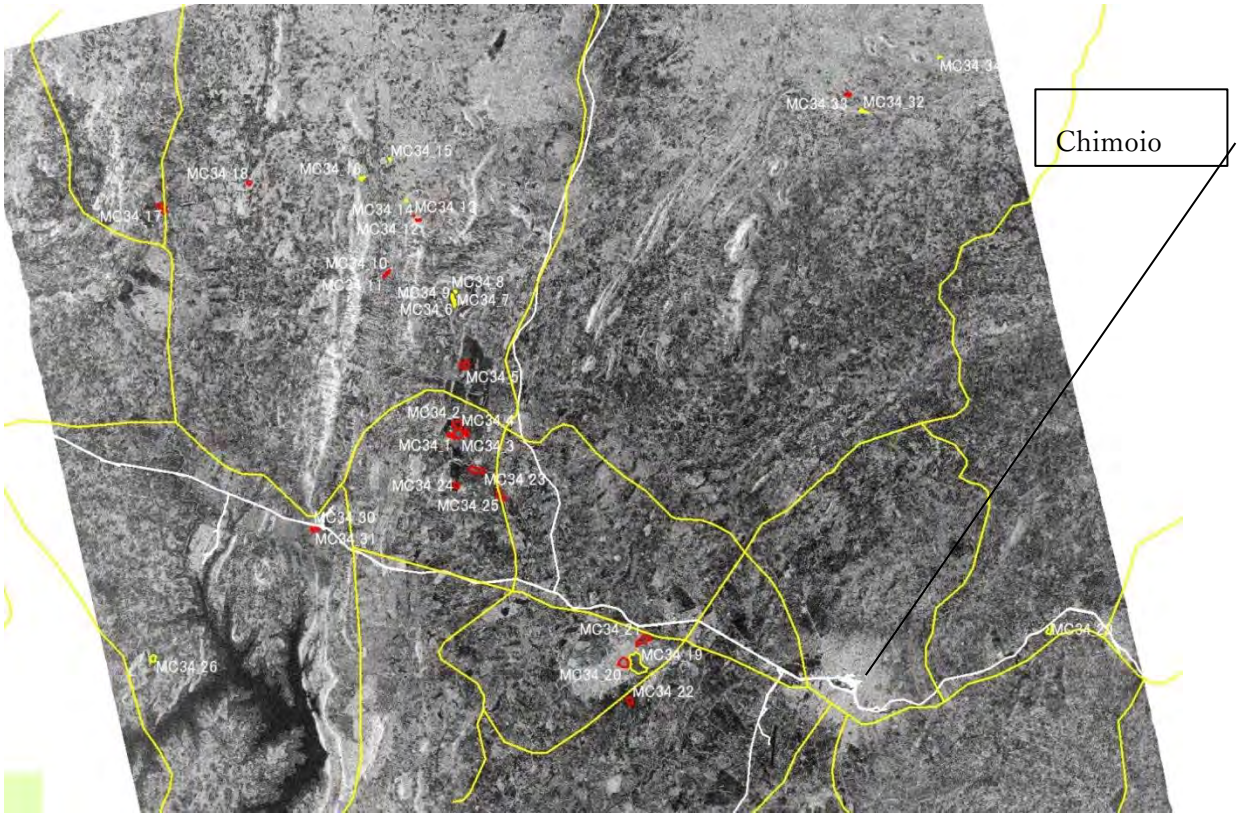

Figure 8 GBFM survey points in Manica (South-side) in December 2015

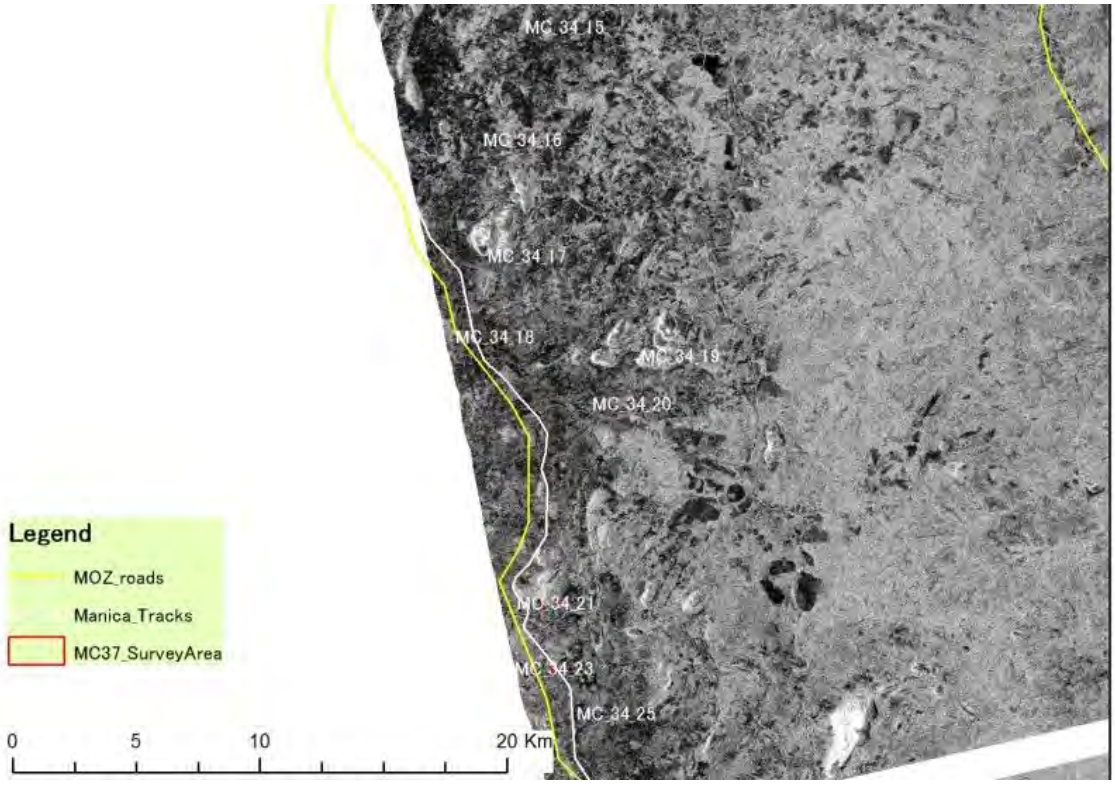

Figure 9 GBFM survey points in Manica (North-side) in December 2015

7) GBFM in Inhambane Province in early and mid-August 2016

As mentioned above, at TWG held in March 2016, it was confirmed that there was large-scale charcoal production in Inhambane Province which led to a wide-range deforestation. By targeting at Morrumbene District, Inhambane Province, ALOS-2 images were obtained. They were taken between August 2015 and July 2016 (scenes on the eastern side) and between December 2014 and December 2015 (scenes on the western side). An analysis and comparison were conducted on those images in the above-mentioned manner and field surveys were carried out in places where there was possible deforestation. The survey schedule for Inhambane Province is shown in Table 8 below.

table 8 Schedule of the GBFM Survey in Inhambane Province in Early and Mid-August 2016

Date (Day of the week)	Survey Area	Survey Points
10th August, Wednesday	Morrumbene district in Inhambane province	INH03, INH04, INH09, INH13, INH14 (Total 5 points)
11th August, Thursday	Massinga and Morrumbene district in Inhambane province	INH05, INH06, INH08, INH15, INH17, INH18 (Total 6 points)
12th August, Friday	Bilene district in Gaza province	GZ02 (Total 1 point)

Figure 10 shows locations where the field surveys were conducted.

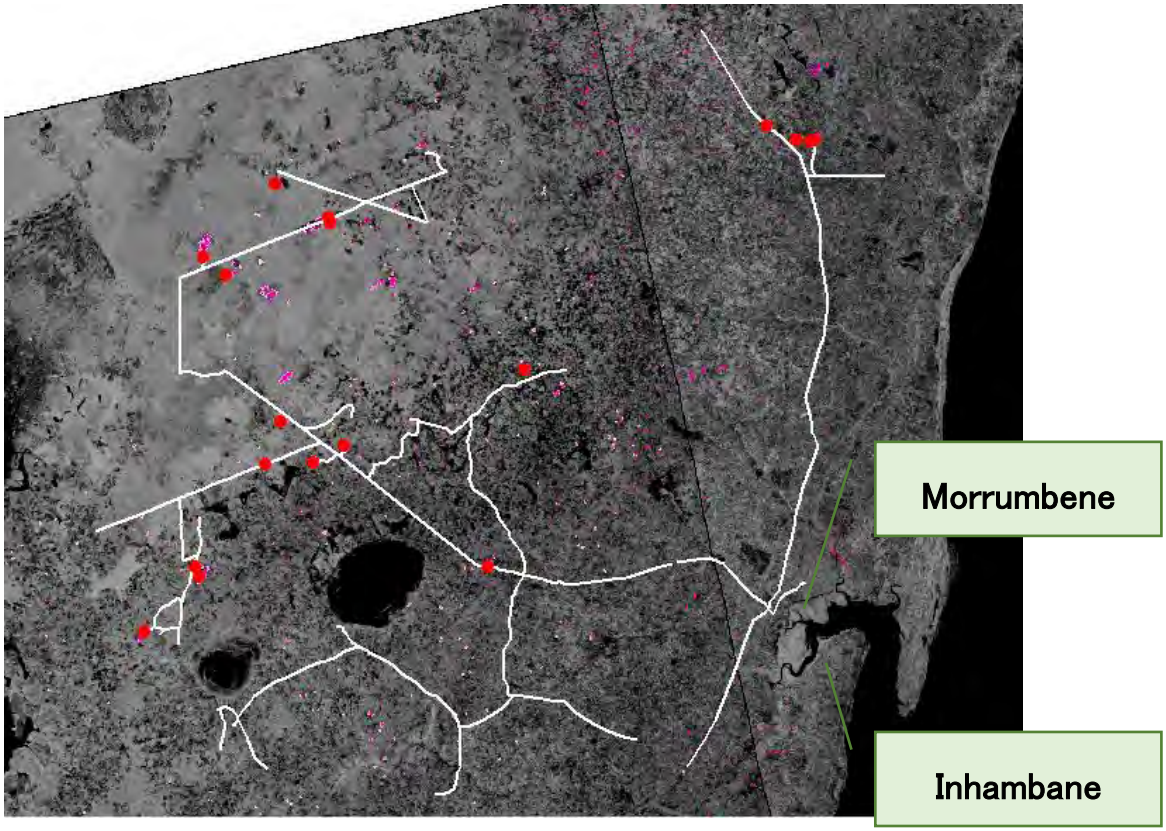

Figure 10 Locations of GBFM Field Survey conducted in Inhambane Province in Early and Mid-August 2016

8) GBFM in Niassa Province in mid-August 2016

Using the results of radar image analysis similar to those mentioned in 1) above, GBFM was conducted in Niassa Province. Compared with other provinces, Niassa Province is located generally at a higher altitude and has many mountainous areas of an altitude of 1,000m or over. As the result, it is characteristic of Niassa Province that plantation is widely used. As its climate is different from that of the Project's target provinces, Gaza and Cabo Delgado, GBFM was conducted for the purpose of extracting deforestation in those large plantation areas where logging had been conducted. Deforested areas in Niassa Province were extracted by obtaining ALOS-2 images taken in October 2015 and June 2016 and conducting automatic classification using several thresholds. In order to check the results and to obtain local boundary data between forested areas and deforested areas, a GBFM field survey was carried out. Also, as there had been a collaboration between JJ-FAST (JICA-JAXA Forest Early Warning System in the Tropics), on the last day of the survey, GBFM was carried out also on Lago District, Niassa Province, where deforestation was found in ScanSAR images (wide-area observation mode). The survey schedule for Niassa Province is shown in Table 9.

table 9 Schedule of the GBFM Survey in Niassa Province in mid-August 2016

Date (Day of the week)	Survey Area	Survey Points
17th August, Wednesday	Muembe district in Niassa province	NS01, NS02, NS03, NS06 (Total 4 points)
18th August, Thursday	Muembe and Sanga district in Niassa province	NS12, NS14, NS18, NS19, NS20 (Total 4 points)
19th August, Friday	Lago district in Niassa province	WT1, WT3, WT4 (Total 3 points)

Figure 11 shows locations where the field surveys were conducted.

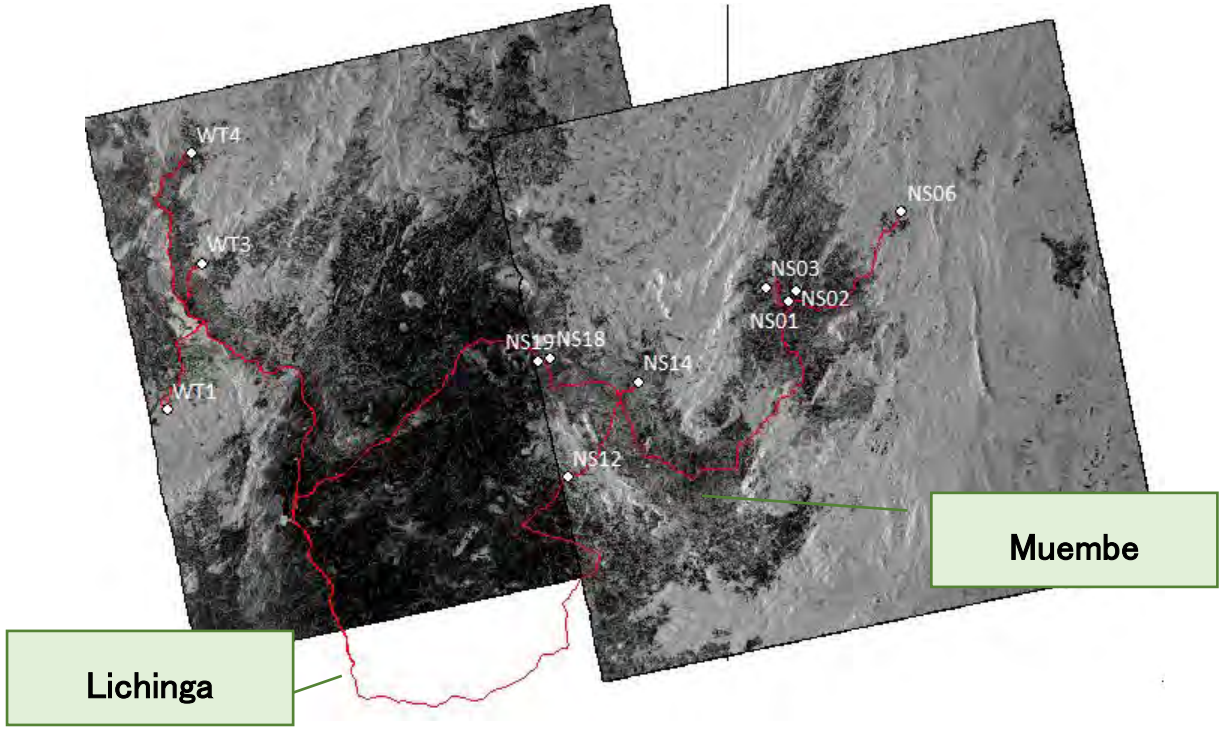

Figure 11 Locations of Areas where GBFM Survey was conducted in Niassa Province in mid-August 2016

Points where the survey was conducted in the above-mentioned provinces total 24, composed of 12 points in Inhambane Province and 12 points in Niassa Province.

In the work plan, GBFM was planned to be implemented four times in the fourth year but it was conducted only twice. This is because, although GBFM field surveys were originally considered to be conducted as on-site surveys to obtain verification data for radar image analysis, data from Sentinel-2, a European mission for satellite-based optical imaging, became available free of charge, and their observation frequency has also been improving. As the result, optical images taken on a date closer to the date when radar images were taken are now available for reference and verification, and it has become unnecessary to visit the site to obtain verification data. Consequently, in the latter half of the fourth year, as there was a shift from a study phase to a verification phase, Sentinel-2 data were used for verification after making a comprehensive review including a review of the security situation.

Introduction to the Desktop ArcGIS

Appendix22 Results of ground-truth survey

In this project, we conducted the ground truth required multiple times to create a forest cover map. In this document, the results of (1) Pre · Grand Truth, (2) Grand Truth, (3) Additional Grand Truth for Cabo Delgado and Gaza Strip, and Manica State, Tete State , Niasa State (4) The results of Grand Truth for the creation of a national forest cover diagram are described.

（1）Implementation of Preliminary Field Surveys

At the beginning of the Project, preliminary field surveys were implemented in Cabo Delgado and Gaza Provinces. The total numbers of survey points in Cabo Delgado and Gaza Provinces were 26 and 10 respectively. The survey results of Cabo Delgado and Gaza Provinces are shown in Table 1 and 2 respectively. At the same time, Figure 1 shows the survey points in Cabo Delgado Province, and Figure 2 shows the survey points in Gaza Province. As a result of the preliminary field surveys, the overall distribution patterns of each forest type across these two provinces were well understood.

Table 1 Results of the Preliminary Field Surveys for Cabo Delgado Province

UID	Province	District	Date	Time	Point No.	Latitude (N)	Longitude (E)	Forest Type							Understory	Slope			Soil		Comments
								General	Land	Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	
1	Cabo Delgado	Pemba	2013/4/29	13:00	1	-12°58′ 41″	40°24′ 37″	Mangrove	4FF	Young	~5m	Open	Good	None	None	Flat	None	None	Brown	Sand	This area is dominated by mangrove trees. Five typical species were found. The height of water surface changes depending on tides. Local people use mangrove trees for chacoals and timber productionbs. This mangrove forest is relatively new. This mangrove
2	Cabo Delgado	Pemba	2013/4/29	14:10	2	-12°57′ 44″	40°22′ 55″	Tree Savana	2TK or	Young	~5m	Medium	Normal	Burned	Grassland	Flat	None	None	Brown	Sand	It is likely that this area used to be agricultural land five years ago. Typical tree species include Acacia.
3	Cabo Delgado	Pemba	2013/4/29	14:30	3	-12°57′ 25″	40°22′ 31″	Grassland	2GL	Young	~2m	Open	Normal	Clear-cut	Grassland	Flat	None	None	Brown	Sand	Firewoods were found in this area. It is expected that this area will be used as pastureland in the near
4	Cabo Delgado	Pemba	2013/4/29	14:50	4	-12°56′ 39″	40°22′ 02″	OpenForest	2WD	Young	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	After underbrush was fired, this area will be used as pastureland.
5	Cabo Delgado	Pemba	2013/4/29	15:05	5	-12°56′ 34″	40°22′ 05″	Deciduous	2WD	Young	~10m	Medium	Normal	None	None	Flat	None	None	Brown	Sand	Cactus were found nearby this area.
6	Cabo Delgado	Ancuabe	2013/4/30	9:50	6	-12°56′ 47″	39°48′ 07″	Deciduous,Thicket	2TK	Young	~10m	Medium	Good	None	Grassland	Flat	None	None	Brown	Sand	
7	Cabo Delgado	Ancuabe	2013/4/30	10:30	7	-12°56′ 49″	39°47′ 52″	Open Miombo	2FD	Young	~15m	Open	Good	None	second-growth forest	Flat	None	None	Brown	Sand	
8	Cabo Delgado	Ancuabe	2013/4/30	14:20	8	-12°50′ 41″	39°41′ 32″	Miombo/Deciduoous	2FD	Medium	~15m	Medium	Good	None	Thicket,Grassland	Flat	None	None	Brown	Sand	Tall miombo trees were found.
9	Cabo Delgado	Ancuabe	2013/4/30	14:35	9	-12°49′ 36″	39°41′ 42″	Semi-evergreen	2FE	Medium	~25m	Dense	Good	None	Thicket,Grassland	Flat	None	None	Brown	Sand	This area is located near a river.
10	Cabo Delgado	Montepuez	2013/5/1	6:40	10	-13°00′ 16″	38°59′ 26″	Miombo	2FD	Young	~10m	Medium	Good	None	Thicket,Grassland	Flat	None	None	Brown	Sand	This area used to be cotton fields in the 1960s and 1970s. Currently, this area is occupied by regenerating
11	Cabo Delgado	Montepuez	2013/5/1	7:52	11	-12°51′ 13″	39°08′ 40″	Miombo/Deciduoous	2FD	Medium	~25m	Medium	Good	None	Grassland	Flat	None	None	Brown	Sand	Typical miombo trees were found in and around this area.
12	Cabo Delgado	Montepuez	2013/5/1	8:14	12	-12°50′ 35″	39°09′ 02″	Open Miombo	2WD	Old	~25m	Open	Good	None	Grassland	Flat	None	None	Brown	Sand	
13	Cabo Delgado	Montepuez	2013/5/1	8:35	13	-12°50′ 03″	39°09′ 11″	Thicket,Grassland	2TK	Young	~10m	Open	Good	None	Grassland	Flat	None	None	Brown	Sand	This area shoud be regarded as forest according to AIFM criteria.
14	Cabo Delgado	Montepuez	2013/5/1	8:56	14	-12°49′ 37″	39°09′ 19″	Grassland	2GL	Young	~2m	Open	Good	None	None	Flat	None	None	Brown	Sand	Fires were scheduled in July.
15	Cabo Delgado	Montepuez	2013/5/1	9:15	15	-12°48′ 57″	39°09′ 26″	Miombo	2FD	Medium	~20m	Medium	Good	None	Thicket,Grassland	Flat	None	None	Brown	Sand	Traces of deforestation activities by local people were found.
16	Cabo Delgado	Montepuez	2013/5/1	9:40	16	-12°49′ 01″	39°10′ 10″	Grassland	2GL	Young	~5m	Open	Good	Burned	Grassland	Flat	None	None	Brown	Sand	
17	Cabo Delgado	Montepuez	2013/5/1	9:50	17	-12°49′ 06″	39°10′ 16″	Miombo,Thicket	2WD c	Young	~10m	Open	Good	None	Thicket,Grassland	Flat	None	None	Brown	Sand	
18	Cabo Delgado	Montepuez	2013/5/1	10:25	18	-12°48′ 09″	39°11′ 20″	Miombo	2WD	Young	~10m	Open	Good	None	Grassland	Flat	None	None	Brown	Sand	It was expected that this area were used for agriculture. In reality, low trees and regrowth of grasses were found on site.
19	Cabo Delgado	Montepuez	2013/5/1	13:40	19	-12°13′ 03″	39°07′ 41″	Deciduous	2FD	Medium	~10m	Open	Bad	None	Dry grass	Flat	None	None	Brown	Sand	
20	Cabo Delgado	Montepuez	2013/5/1	14:00	20	-12°11′ 46″	39°08′ 26″	Deciduous	2FD	Medium	~10m	Open	Bad	Burned	None	Flat	None	None	Brown	Sand	This area is an old burned field. It is believed that miombo trees need to be fired occasionally. Miombo forests can be separated from other deciduous forests only based on whether or not indicator species are found on site.
21	Cabo Delgado	Montepuez	2013/5/1	14:50	21	-12°05′ 32″	39°12′ 49″	Evergreen	2FE	-	-	-	-	-	-	-	-	-	-	-	Photoes were taken from a bridge. Gallery forests were found nearby.
22	Cabo Delgado	Mueda	2013/5/1	16:25	22	-11°45′ 37″	39°30′ 37″	Deciduous	1CXF	Old	~25m	Open	Good	-	-	Flat	None	None	Brown	Sand	Cassava were cultivated on the ground.
23	Cabo Delgado	Mueda	2013/5/2	8:10	23	-11°39′ 47″	39°32′ 01″	Semi-evergreen	2FE	Young	~5m	Dense	Bad	-	-	Gentle	South	Short	Brown	Sand	
24	Cabo Delgado	Mueda	2013/5/2	8:34	24	-11°39′ 35″	39°32′ 07″	-	-	-	-	-	-	-	-	-	-	-	-	-	
25	Cabo Delgado	Mueda	2013/5/2	8:47	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Interviews to local resindets were conducted.
26	Cabo Delgado	Mueda	2013/5/2	9:25	26	-11°42′ 07″	39°31′ 36″	-	-	-	-	-	-	-	-	-	-	-	-	-	
27	Cabo Delgado	Mueda	2013/5/2	11:30	27	-11°15′ 16″	39°16′ 46″	Miombo	2FD	Medium	~15m	Medium	Good	-	Grassland	Medium	North	Long	Red	Small	Indicator species of Miombo forests were found.

Table 2 Results of the Preliminary Field Surveys for Gaza Province

UID	Province	District	Date	Time	Point No.	Latitude (N)	Longitude (E)	Forest Type							Understory	Slope			Soil		Comments
								General	Land	Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	
1	Gaza	Bilene	2013/5/5	12:56	1	-25°04′ 03″	32°58′ 46″	Scrubland	2GL	Medium	~5m	Open	Good	None	Grassland	Flat	None	None	Brown	Sand	Typical scrublands were found. This area remained untouched, and vegetatation conditions had not been much changed probably since around 1992.
2	Gaza	Bilene	2013/5/5	13:30	2	-25°02′ 40″	33°07′ 06″	Agricultural	1FC	-	-	-	-	-	-	-	-	-	-	-	
3	Gaza	Bilene	2013/5/5	15:42	3	-25°02′ 23″	33°10′ 25″	Thicket	2TK	Young	~5m	Open	Normal	None	Shrub	Flat	None	None	Brown	Sand	Overall, typical tree height in this area is 3-5m. Tall trees were found occasioally. There were not so much grass on the ground. Forest degradation due to charcoal productions had happened for a long time.
4	Gaza	Bilene	2013/5/5	16:09	4	-25°03′ 46″	33°11′ 09″	deserted cultivated land	1CXF	Young	~5m	Open	Normal	None	Grassland	Flat	None	None	Brown	Sand	This area was changed to cultivated lands after 2008, in which the satellite imagery was obtained. The cycle of shifting cultivation in this area is typically 3-5 years.
5	Gaza	Bilene	2013/5/5	16:43	5	-25°02′ 00″	33°08′ 16″	Field Crop	1FC	-	-	-	-	-	Grassland	Flat	None	None	Brown	Sand	Mango trees and Caju trees were found.
6	Gaza	Mabalane	2013/5/6	13:39	6	-23°14′ 35″	32°31′ 13″	Evergreen, Mecrruse	2FE	Medium	~10m	Medium	Normal	Selective	None	Flat	None	None	Yellow	Sand	
7	Gaza	Mabalane	2013/5/6	14:00	7	-23°13′ 22″	32°30′ 44″	Deciduous, Marula	2WD	Medium	~10m	Open	Normal	None	Grassland	Flat	None	None	Red	Sand	
8	Gaza	Mabalane	2013/5/6	14:20	8	-23°11′ 26″	32°29′ 04″	Mopane	2WD	Young	~2m	Open	Normal	Burned	Grass and Cactus	Flat	None	None	Brown	Sand	Tall trees are found in sides of roads. On the other hands, low trees were found in areas farther out from the roads. Mopane trees in this area usually defoliate from August to September.
9	Gaza	Mabalane	2013/5/6	14:40	9	-23°10′ 18″	32°27′ 24″	Mopane	2FD	Medium	~10m	Medium	Normal	None	None	Flat	None	None	Gray	Sand	
10	Gaza	Mabalane	2013/5/6	14:59	10	-23°08′ 53″	32°25′ 37″	Mopane	2WD	Young	~3m	Open	Normal	None	Grass and Cactus	Flat	None	None	Brown	Sand	Tall mopane trees were found in the distance.

Figure 1 Preliminary Field Survey Points in Cabo Delgado Province

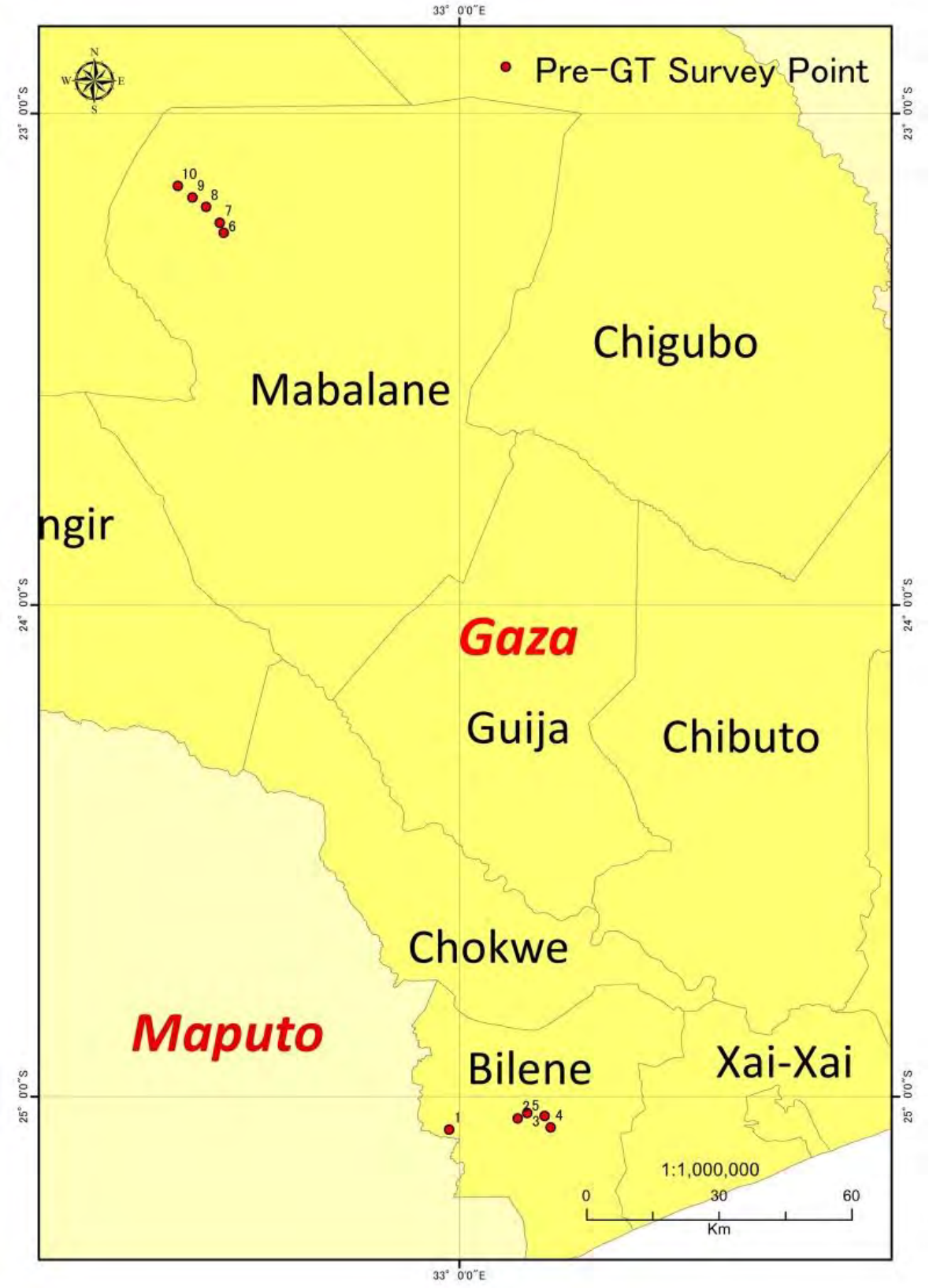

Figure 2 Preliminary Field Survey Points in Gaza Province

（2） Implementation of Ground Truth Surveys

Results of the GT surveys in Cabo Delgado and Gaza Provinces are shown in Table 3 and 4 respectively. In the same manner as the preliminary field surveys, the tentative classification items were used. The total numbers of survey points in Cabo Delgado and Gaza Provinces were 91 and 104 respectively. The results of these GT surveys were saved in digital files as appendix 16. Figure 3 shows the GT survey points in Cabo Delgado Province, and Figure 4 shows the GT survey points in Gaza Province. In advance of these GT surveys, features of satellite imagery were closely examined, and survey points were selected in areas where typical forest types can be found. The survey point maps also indicate that the GT surveys were conducted in a wide area of the provinces. The GT survey results were used as samples to prepare training data for the following classification analysis. The classification flow was developed using these samples.

Figure 3 Ground Truth Surveys

Table 3 Results of the GT Surveys for Cabo Delgado Province

UID	Province	District	Date	Time	Surveyor	Point No.	Location			Land Cover	Forest					Understory	Slope			Soil		Comment
							Latitude	Longitude	Elevation		Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	
1	Cabo Delgado	Pemba	31/10/2013	8:15	Kawai and Nakanishi	CD001	-13°04′ 00″	40°31′ 14″	101	Tree Crops	Medium	~10m	Open	Normal	None	None	Gentle	West	Long	Red	Sand	Tree crops (Caju) were found.
2	Cabo Delgado	Mecufi	31/10/2013	9:27	Kawai and Nakanishi	CD002	-13°05′ 30″	40°31′ 33″	95	Field Crops	Medium	~10m	Open	Good	None	Cassava	Gentle	South West	Long	Brown	Sand	Field crops and tree crops (old Caju, Mango, Cassava) were found in a mixed manner.
3	Cabo Delgado	Mecufi	31/10/2013	10:19	Kawai and Nakanishi	CD003	-13°08′ 34″	40°33′ 25″	17	Tree Crops	Old	~10m	Open	Good	None	Beans, Mapira	Flat	None	None	Brown	Sand	
4	Cabo Delgado	Quissanga	31/10/2013	12:22	Kawai and Nakanishi	CD004	-12°38′ 41″	40°25′ 14″	66	Grassland	Medium	~5m	Open	Normal	Burned	Grass	Flat	None	None	Brown	Sand	A fire occurred lately. Deciduous forest was found to the south of this point.
5	Cabo Delgado	Quissanga	31/10/2013	13:57	Kawai and Nakanishi	CD005	-12°26′ 16″	40°29′ 41″	10	Inundated Grassland	None	0m	Open	None	None	None	Flat	None	None	Brown	Sand	From November to March, this land is usually used as paddy field.
6	Cabo Delgado	Quissanga	31/10/2013	14:09	Kawai and Nakanishi	CD093	-12°26′ 27″	40°29′ 48″	7	Mnagrove	Old	~5m	Open	Good	None	None	Flat	None	None	Brown	Sand	
7	Cabo Delgado	Quissanga	31/10/2013	13:35	Kawai and Nakanishi	CD006	-12°24′ 00″	40°30′ 58″	6	Inundated Sand	None	0m	Open	None	None	Grass	Flat	None	None	White	Sand	
8	Cabo Delgado	Pemba	31/10/2013	16:41	Kawai and Nakanishi	CD007	-13°02′ 10″	40°24′ 02″	13	Grassland	Old	~2m	Open	Normal	None	Grass	Flat	None	None	Brown	Sand	
9	Cabo Delgado	Pemba	1/11/2013	8:15	Kawai and Nakanishi	CD008	-13°04′ 10″	40°22′ 25″	81	Grassland	None	~2m	Open	Death	None	Grass	Flat	None	None	Brown	Sand	After Novembe, this land usually changes to grassland. Trees with leaves are found during rainy season, which lasts usually from December to June.
10	Cabo Delgado	Pemba	1/11/2013	8:49	Kawai and Nakanishi	CD009	-13°07′ 59″	40°16′ 06″	163	Grassland	Young	~5m	Open	Good	Burned	Grass (Death)	Gentle	South West	Short	Red	Small	Shifting cultivation was previously conducted in this area. Thickets were regrowing. Indicators species of Miombo forest were found.
11	Cabo Delgado	Ancuabe	1/11/2013	9:19	Kawai and Nakanishi	CD010	-13°07′ 40″	40°10′ 58″	232	Grassland	Young	~5m	Open	Good	None	Grass	Medium	South West	Medium	Brown	Sand	
12	Cabo Delgado	Ancuabe	1/11/2013	9:47	Kawai and Nakanishi	CD011	-13°07′ 29″	40°01′ 08″	310	Dense Deciduous Thicket	Young	~5m	Open	Good	None	Grass (Burned)	Gentle	West	Medium	Brown	Sand	
13	Cabo Delgado	Ancuabe	1/11/2013	10:58	Kawai and Nakanishi	CD013	-12°54′ 48″	39°31′ 16″	494	Deciduous Forest	Medium	~10m	Open	Good	None	Grass	Flat	None	None	Red	Sand	A boundary between semi-deciduous forest and commercial agriculture (cotton) was found.
14	Cabo Delgado	Montepuez	1/11/2013	12:00	Kawai and Nakanishi	CD014	-13°02′ 40″	39°14′ 27″	539	Deciduous Forest	Medium	~10m	Open	Normal	None	Dried grass	Flat	None	None	Brown	Small	
15	Cabo Delgado	Montepuez	1/11/2013	17:15	Kawai and Nakanishi	CD015	-13°09′ 31″	38°57′ 57″	506	Inundated Grassland												This land can be flooded during a rany season, which lasts usually from November to March.
16	Cabo Delgado	Balama	1/11/2013	16:47	Kawai and Nakanishi	CD017	-13°16′ 39″	38°49′ 27″	477	Grassland												Gallery forest was found to the south of this point.
17	Cabo Delgado	Montepuez	1/11/2013	15:57	Kawai and Nakanishi	CD019	-13°22′ 58″	38°26′ 43″	564	Grassland	None	0m	Open	None	None	None	Flat	None	None	Brown	Sand	
18	Cabo Delgado	Balama	1/11/2013	15:46	Kawai and Nakanishi	CD020	-13°23′ 32″	38°25′ 07″	549	Grassland	Young	~5m	Open	Normal	None	Grass	Flat	None	None	Brown	Sand	
19	Cabo Delgado	Balama	1/11/2013	15:30	Kawai and Nakanishi	CD021	-13°24′ 33″	38°22′ 54″	573	Grassland	None	0m	Open	None	None	None	Flat	None	None	Red	Sand	This land has been used as a permanent commercial agriculture (maize).
20	Cabo Delgado	Montepuez	2/11/2013	8:01	Kawai and Nakanishi	CD022	-13°00′ 15″	38°59′ 25″	485	Deciduous Forest	Young	~5m	Open	Normal	None	None	Flat	None	None	Brown	Sand	This time, leaves fell while trees with leaves were found at the previous survey. Miombo is currently regrowing after shifting cultivation.
21	Cabo Delgado	Montepuez	2/11/2013	9:14	Kawai and Nakanishi	CD023	-12°51′ 13″	39°08′ 40″	459	Deciduous Forest	Medium	~15m	Open	Normal	Burned	Dried grass	Flat	None	None	Brown	Sand	Indicator species: *Brachystegia Spisiformis* and *Julbernadia Globliflora* .
22	Cabo Delgado	Montepuez	2/11/2013	9:35	Kawai and Nakanishi	CD024	-12°50′ 35″	39°09′ 02″	467	Deciduous Forest	Medium	~15m	Open	Normal	Burned	Grass (Burned)	Flat	None	None	Red	Sand	
23	Cabo Delgado	Montepuez	2/11/2013	9:58	Kawai and Nakanishi	CD025	-12°48′ 57″	39°09′ 25″	471	Deciduous Forest	Old	~20m	Open	Normal	Burned	None	Flat	None	None	Brown	Sand	
24	Cabo Delgado	Montepuez	2/11/2013	10:23	Kawai and Nakanishi	CD026	-12°48′ 09″	39°11′ 20″	421	Deciduous Forest	Young	~10m	Open	Normal	Burned	Grass (Burned)	Flat	None	None	Brown	Sand	Bamboo trees were found. Indicator species: *Dalbergia Melanoxylon* .
25	Cabo Delgado	Montepuez	2/11/2013	12:31	Kawai and Nakanishi	CD027	-12°45′ 02″	38°59′ 42″	421	Deciduous Forest	Young	~10m	Open	Normal	None	Dried grass	Flat	None	None	Brown	Sand	Regeneration of Miombo forest was found. Indicator species: *Brachystegia Spisiformis* and *Julbernadia Globliflora* .
26	Cabo Delgado	Montepuez	3/11/2013	10:54	Kawai and Nakanishi	CD028	-12°26′ 32″	39°01′ 04″	401	Deciduous Forest	Medium	~15m	Open	Good	None	Burned	Flat	None	None	Brown	Sand	Indicator species: *Brachystegia Spisiformis* and *Julbernadia Globliflora* .
27	Cabo Delgado	Montepuez	2/11/2013	15:57	Kawai and Nakanishi	CD094	-12°22′ 07″	38°59′ 10″	406	Deciduous Forest												
28	Cabo Delgado	Montepuez	2/11/2013	14:16	Kawai and Nakanishi	CD030	-12°15′ 47″	38°49′ 35″	394	Deciduous Forest	Medium	~15m	Open	Normal	Burned	Dried grass	Flat	None	None	Red	Sand	
29	Cabo Delgado	Montepuez	3/11/2013	11:29	Kawai and Nakanishi	CD031	-12°19′ 56″	39°03′ 40″	376	Deciduous Forest	Young	~10m	Open	Normal	Burned	None	Flat	None	None	Brown	Sand	Bamboos, which are usually not found in Miombo forest, exist. This land was possibly used as settlement in the year 2008.
30	Cabo Delgado	Mueda	3/11/2013	13:09	Kawai and Nakanishi	CD032	-11°53′ 58″	39°20′ 35″	351	Deciduous Forest	Young	~15m	Open	Normal	Burned	None	Flat	None	None	Brown	Sand	
31	Cabo Delgado	Mueda	3/11/2013	13:43	Kawai and Nakanishi	CD033	-11°48′ 18″	39°27′ 23″	333	Deciduous Forest	Old	~20m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	Indicator species: *Baobab* and *Sclerocarrie Biree* . Fires are often conducted from June to October.
32	Cabo Delgado	Mueda	3/11/2013	14:11	Kawai and Nakanishi	CD034	-11°45′ 36″	39°30′ 36″	379	Evergreen Forest	Old	~25m	Open	Good	None	None	Flat	None	None	Brown	Sand	Signs of fires were found.
33	Cabo Delgado	Mueda	3/11/2013	14:20	Kawai and Nakanishi	CD095	-11°45′ 38″	39°30′ 42″	384	Evergreen Forest		~25m										
34	Cabo Delgado	Mueda	4/11/2013	10:50	Kawai and Nakanishi	CD035	-11°24′ 53″	38°58′ 39″	282	Dense Deciduous Thicket	Old	~5m	Open	Normal	None	None	Flat	None	None	Brown	Sand	
35	Cabo Delgado	Mueda	4/11/2013	11:18	Kawai and Nakanishi	CD036	-11°22′ 42″	38°56′ 07″	267	Dense Deciduous Thicket	Old	~5m	Open	Normal	None	None	Flat	None	None	Red	Sand	CD36-1 is boundary between Thicket and Forest.
36	Cabo Delgado	Mueda	4/11/2013	11:28	Kawai and Nakanishi	CD096	-11°22′ 38″	38°56′ 02″	266	Deciduous Forest												A boundary between deciduous thickets and deciduous forest was found.
37	Cabo Delgado	Mueda	4/11/2013	12:00	Kawai and Nakanishi	CD037	-11°18′ 02″	39°00′ 24″	237	Deciduous Forest	Old	~15m	Open	Normal	None	None	Gentle	South West	Short	Brown	Small	Signs of fires for hunting of animals were found.
38	Cabo Delgado	Mueda	4/11/2013	12:21	Kawai and Nakanishi	CD038	-11°17′ 00″	39°00′ 48″	236	Dense Deciduous Thicket	Old	~5m	Open	Normal	None	None	Flat	None	None	Red	Sand	
39	Cabo Delgado	Mueda	4/11/2013	13:02	Kawai and Nakanishi	CD039	-11°16′ 09″	39°10′ 38″	133	Grassland	Old	~25m	Open	Normal	Burned	Dried grass	Flat	None	None	Brown	Sand	This area is temporarily flooded.
40	Cabo Delgado	Mueda	4/11/2013	13:20	Kawai and Nakanishi	CD040	-11°15′ 28″	39°12′ 24″	165	Deciduous Forest	Old	~15m	Open	Good	None	None	Flat	None	None	Brown	Sand	
41	Cabo Delgado	Mueda	4/11/2013	13:30	Kawai and Nakanishi	CD097	-11°15′ 28″	39°12′ 24″	213	Deciduous Forest		~10m										
42	Cabo Delgado	Mueda	4/11/2013	13:42	Kawai and Nakanishi	CD041	-11°15′ 10″	39°16′ 22″	306	Deciduous Forest	Old	~20m	Medium	Good	Burned	None	Flat	None	None	Brown	Sand	Indicator species: *Diplorymchus Condilocarpon* .
43	Cabo Delgado	Mueda	4/11/2013	13:58	Kawai and Nakanishi	CD042	-11°15′ 43″	39°17′ 01″	288	Deciduous Forest	Old	~20m	Open	Good	None	Dried grass, Bamboo	Flat	None	None	Brown	Sand	Signs of fires for hunting of animals were found. Trees with leaves are found usually from October to May.
44	Cabo Delgado	Mueda	4/11/2013	14:47	Kawai and Nakanishi	CD043	-11°23′ 16″	39°21′ 54″	691	Evergreen Forest	Medium	~5m	Medium	Good	None	None	Flat	None	None	Brown	Sand	
45	Cabo Delgado	Mueda	4/11/2013	15:18	Kawai and Nakanishi	CD044	-11°31′ 07″	39°29′ 10″	878	Grassland	None	None	Open	None	None	None	Flat	None	None	Brown	Sand	This land is currently used as agriculture (cassava). This land is located near villages, and it is possible that this land use type changed from thickets to agriculture after fires.
46	Cabo Delgado	Mueda	4/11/2013	15:25	Kawai and Nakanishi	CD098	-11°31′ 07″	39°29′ 09″	882	Dense Evergreen Thicket		~5m										
47	Cabo Delgado	Mueda	5/11/2013	7:36	Kawai and Nakanishi	CD099	-11°31′ 04″	39°43′ 15″	525	Dense Evergreen Thicket		~5m										
48	Cabo Delgado	Mueda	5/11/2013	7:42	Kawai and Nakanishi	CD100	-11°28′ 20″	39°44′ 23″	515	Dense Evergreen Thicket		~5m										
49	Cabo Delgado	Mueda	7/11/2013	9:36	Kawai and Nakanishi	CD045	-11°37′ 11″	39°37′ 51″	676	Dense Deciduous Thicket	Medium	~5m	Dense	Normal	None	None	Flat	None	None	Brown	Sand	This land changes from forest, agriculture, to thicket, and this shift is repeated in a cyclic manner,
50	Cabo Delgado	Mueda	7/11/2013	9:07	Kawai and Nakanishi	CD046	-11°33′ 03″	39°51′ 49″	313	Deciduous Forest	Medium	~15m	Open	Normal	None	Thicket	Flat	None	None	Brown	Sand	A boundary between tree crops (Caju) and deciduous forest was found. This land is used as agriculture after fires were conducted.

Table 4 Results of the GT Surveys for Cabo Delgado Province (Continued)

UID	Province	District	Date	Time	Surveyor	Point No.	Location			Land Cover	Forest					Understory	Slope			Soil		Comment
							Latitude	Longitude	Elevation		Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	
51	Cabo Delgado	Mocimboa da Praia	7/11/2013	8:49	Kawai and Nakanishi	CD047	-11°31′ 48″	39°59′ 15″	193	Deciduous Forest	Young	~10m	Open	Good	Burned	Dried grass	Steep	North West	Medium	Brown	Sand	Deciduous trees were found to the north of this point. This land is on a steep slope. Signs of the past fires were found.
52	Cabo Delgado	Mocimboa da Praia	7/11/2013	8:24	Kawai and Nakanishi	CD048	-11°25′ 54″	40°11′ 27″	102	Dense Deciduous Thicket	Medium	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	Deciduous trees with height of 15m were found sporadically.
53	Cabo Delgado	Palma	6/11/2013	13:31	Kawai and Nakanishi	CD049	-10°33′ 33″	40°23′ 20″	73	Dense Deciduous Thicket	Medium	~5m	Open	Good	None	None	Flat	None	None	Red	Sand	
54	Cabo Delgado	Palma	6/11/2013	13:17	Kawai and Nakanishi	CD050	-10°35′ 50″	40°24′ 25″	18	Grassland	Young	~5m	Open	Normal	Burned	Dried grass	Flat	None	None	Brown	Sand	This land is temporarily inundated and located between areas dominated by evergreen trees.
55	Cabo Delgado	Palma	6/11/2013	13:04	Kawai and Nakanishi	CD051	-10°35′ 51″	40°26′ 25″	19	Evergreen Forest	Medium	~25m	Dense	Good	None	Grass	Flat	None	None	Brown	Sand	
56	Cabo Delgado	Palma	6/11/2013	12:55	Kawai and Nakanishi	CD052	-10°35′ 47″	40°26′ 36″	28	Evergreen Forest	Old	~20m	Medium	Good	None	Dried grass	Medium	North West	Long	Brown	Sand	This point is located on steep slope.
57	Cabo Delgado	Palma	6/11/2013	12:18	Kawai and Nakanishi	CD053	-10°35′ 36″	40°27′ 33″	12	Inundated Sand	None	0m	Open	None	None	None	Flat	None	None	Brown	Sand	This land is inundated at high tide. Evergreen trees are found to the eat and west of this point.
58	Cabo Delgado	Palma	6/11/2013	12:30	Kawai and Nakanishi	CD054	-10°35′ 23″	40°27′ 43″	11	Mangrove	Medium	~5m	Open	Good	None	None	Flat	None	None	Brown	Sand	Evergreen trees were found to the west of this point.
59	Cabo Delgado	Palma	6/11/2013	12:03	Kawai and Nakanishi	CD055	-10°35′ 58″	40°27′ 55″	34	Tree Crops	Medium	~10m	Open	Normal	Burned	None	Gentle	North West	Medium	Brown	Sand	Tree crops (Caju with height of 5m) were found next to villages. This land is on gentle slope.
60	Cabo Delgado	Palma	6/11/2013	11:48	Kawai and Nakanishi	CD056	-10°36′ 08″	40°29′ 06″	13	Mangrove	Medium	~10m	Medium	Good	None	None	Flat	None	None	None	None	This land is inundated at high tide.
61	Cabo Delgado	Palma	6/11/2013	11:33	Kawai and Nakanishi	CD057	-10°36′ 02″	40°29′ 35″	23	Shrubland	Young	~5m	Open	Normal	None	Dried grass	Flat	None	None	Brown	Sand	Evergreen trees with height of 15m were found ahead of this point.
62	Cabo Delgado	Palma	6/11/2013	10:51	Kawai and Nakanishi	CD058	-10°37′ 13″	40°30′ 43″	30	Grassland	Young	~2m	Open	Normal	Burned	Burned grass	Flat	None	None	Brown	Sand	
63	Cabo Delgado	Palma	6/11/2013	11:00	Kawai and Nakanishi	CD101	-10°37′ 13″	40°30′ 47″	33	Evergreen Forest	Medium	~20m	Dense	Good	None	Vegetation (1m tall)	Flat	None	None	Brown	Sand	
64	Cabo Delgado	Nangade	5/11/2013	12:27	Kawai and Nakanishi	CD059	-10°56′ 41″	39°46′ 47″	124	Deciduous Forest	Old	~25m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	
65	Cabo Delgado	Nangade	5/11/2013	13:03	Kawai and Nakanishi	CD060	-10°55′ 13″	39°53′ 17″	171	Dense Deciduous Thicket	Medium	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	
66	Cabo Delgado	Palma	5/11/2013	13:26	Kawai and Nakanishi	CD061	-10°53′ 21″	39°58′ 51″	158	Deciduous Forest	Medium	~15m	Medium	Good	None	None	Flat	None	None	Brown	Sand	
67	Cabo Delgado	Palma	5/11/2013	13:56	Kawai and Nakanishi	CD062	-10°52′ 31″	40°01′ 14″	154	Tree Crops	Medium	~10m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	Tree crops (Caju) were found.
68	Cabo Delgado	Palma	5/11/2013	14:05	Kawai and Nakanishi	CD063	-10°52′ 33″	40°01′ 27″	151	Tree Crops	Medium	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	A boundary between tree crops (Caju) and thickets was found. It is possible that this land was covered by thickets in the year 2008.
69	Cabo Delgado	Palma	5/11/2013	14:09	Kawai and Nakanishi	CD102	-10°52′ 34″	40°01′ 27″	153	Dense Deciduous Forest		~5m										
70	Cabo Delgado	Palma	5/11/2013	14:24	Kawai and Nakanishi	CD064	-10°53′ 19″	40°03′ 16″	138	Tree Crops	Young	~5m	Open	Good	None	Vegetation (regrowth)	Flat	None	None	Brown	Sand	5 to 7-year-old Caju trees were found. It is possible that this land was bare land in the year 2008.
71	Cabo Delgado	Palma	5/11/2013	15:35	Kawai and Nakanishi	CD065	-10°49′ 55″	40°11′ 38″	138	Evergreen Forest	Medium	~10m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	Dense understory vegetation were found.
72	Cabo Delgado	Palma	6/11/2013	10:17	Kawai and Nakanishi	CD070	-10°45′ 15″	40°27′ 22″	49	Inundated Grassland	None	~2m	Open	Normal	None	None	Flat	None	None	White	Sand	This land is temporarily flooded from January to July.
73	Cabo Delgado	Mueda	7/11/2013	10:03	Kawai and Nakanishi	CD103	-11°41′ 54″	39°37′ 04″	773	Dense Deciduous Thicket		~5m										
74	Cabo Delgado	Muidumbe	7/11/2013	10:33	Kawai and Nakanishi	CD077	-11°45′ 47″	39°50′ 04″	573	Dense Deciduous Thicket	Young	~2m	Dense	Normal	None	None	Flat	None	None	Brown	Sand	
75	Cabo Delgado	Macomia	7/11/2013	11:28	Kawai and Nakanishi	CD078	-11°55′ 18″	40°06′ 25″	154	Decidous Forest	Old	~15m	Open	Normal	Burned	Dried grass	Flat	None	None	Brown	Sand	Deciduous forest and partly tree crops (Caju) were found. While tree crops were found along the roads, deciduous trees were found off the roads.
76	Cabo Delgado	Macomia	7/11/2013	11:43	Kawai and Nakanishi	CD079	-11°59′ 22″	40°07′ 57″	101	Evergreen Forest	Old	~15m	Dense	Good	None	Vegetation	Steep	West	Long	Brown	Sand	Gallery forest was found. ・Indicator species: *Afzelia Quanzensis* .
77	Cabo Delgado	Macomia	7/11/2013	11:51	Kawai and Nakanishi	CD104	-11°59′ 21″	40°07′ 55″	91	Evergreen Forest (Gallery Forest)												Indicator species: *Afzelia Qualizensis* .
78	Cabo Delgado	Macomia	7/11/2013	12:18	Kawai and Nakanishi	CD105	-12°08′ 12″	40°07′ 15″	138	Inundated Grassland		~5m										
79	Cabo Delgado	Macomia	7/11/2013	12:37	Kawai and Nakanishi	CD081	-12°12′ 45″	40°07′ 23″	295	Open Deciduous Thicket	Young	~5m	Open	Normal	None	Dried grass	Flat	None	None	Brown	Sand	This land is currently covered by deciduous thickets. However, it is possible that this land was used for agriculture in the year 2008.
80	Cabo Delgado	Macomia	7/11/2013	12:48	Kawai and Nakanishi	CD106	-12°12′ 51″	40°07′ 30″	285	Open Deciduous Thicket												
81	Cabo Delgado	Meluco	7/11/2013	14:34	Kawai and Nakanishi	CD082	-12°27′ 44″	40°04′ 58″	111	Decidous Forest	Medium	~15m	Open	None	None	Bottom of a river	Flat	None	None	Brown	Sand	Evergreen forest with height of 30m and deciducous trees were found in a mixed manner. The time period when leaves fall is usually around July, and it is possible that trees with leaves can be found on satellite images used for this project.
82	Cabo Delgado	Meluco	7/11/2013	15:00	Kawai and Nakanishi	CD083	-12°38′ 25″	40°01′ 07″	100	Inundated Grassland	None	0m	Open	None	None	Dried grass	Flat	None	None	Brown	Sand	This land is temporarily flooded during rainy season.
83	Cabo Delgado	Quissanga	7/11/2013	15:29	Kawai and Nakanishi	CD084	-12°48′ 03″	39°58′ 48″	256	Decidous Forest	Medium	~15m	Open	Good	Burned	Dried grass	Flat	None	None	Brown	Sand	Indicator species: *Diplorimchs Condilocarpon* .
84	Cabo Delgado	Nangade	5/11/2013	8:14	Kawai and Nakanishi	CD085	-11°19′ 23″	39°43′ 05″	436	Dense Deciduous Thicket	Medium	~5m	Open	Normal	Burned	None	Flat	None	None	Brown	Sand	
85	Cabo Delgado	Nangade	5/11/2013	8:32	Kawai and Nakanishi	CD086	-11°19′ 14″	39°42′ 54″	397	Tree Crops	Medium	~10m	Open	Good	None	None	Gentle	West	Long	Brown	Sand	
86	Cabo Delgado	Nangade	5/11/2013	8:38	Kawai and Nakanishi	CD087	-11°19′ 18″	39°42′ 49″	398	Decidous Forest	Medium	~20m	Open	Good	Burned	None	Gentle	West	Long	Brown	Sand	
87	Cabo Delgado	Nangade	5/11/2013	9:33	Kawai and Nakanishi	CD107	-11°19′ 13″	39°36′ 50″	465	Deciduous Forest												
88	Cabo Delgado	Nangade	5/11/2013	10:10	Kawai and Nakanishi	CD089	-11°05′ 57″	39°40′ 35″	269	Deciduous Forest	Old	~20m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	This point is located in a area where satellite imagery for both dry and rainy seasons are available.
89	Cabo Delgado	Palma	5/11/2013	15:13	Kawai and Nakanishi	CD091	-10°51′ 13″	40°09′ 44″	137	Evergreen Forest	Medium	~20m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	
90	Cabo Delgado	Palma	5/11/2013	15:18	Kawai and Nakanishi	CD108	-10°51′ 14″	40°09′ 43″	142	Evergreen Forest		~10m										
91	Cabo Delgado	Palma	5/11/2013	15:55	Kawai and Nakanishi	CD092	-10°46′ 16″	40°12′ 24″	125	Decidous Forest	Medium	~20m	Medium	Good	None	Dried grass	Flat	None	None	Yellow	Sand	

Table 5 Results of GT Surveys for Gaza Province

UID	Province	District	Date	Time	Surveyor	Point No.	Location			Land Cover	Forest					Understory	Slope			Soil		Comment
							Latitude	Longitude	Elevation		Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	
1	Gaza	Xai-Xai	19/11/2013	11:10	Kawai and Nakanishi	GZ003	-25°03′ 32″	33°28′ 37″	7	Inundated Grassland	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	This land was used for agriculture (sugarcane and bananas). This land is temporarily inundated.
2	Gaza	Xai-Xai	19/11/2013	11:38	Kawai and Nakanishi	GZ004	-25°00′ 50″	33°37′ 13″	10	Grassland	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	
3	Gaza	Xai-Xai	11/11/2013	16:30	Kawai and Nakanishi	GZ005	-25°04′ 41″	33°41′ 30″	2	Inundated Grassland	None	~2m	Dense	Good	None	None	Flat	None	None	Brown	Sand	Understory grasses of this land are temporarily inundated usually from October to March.
4	Gaza	Xai-Xai	11/11/2013	16:10	Kawai and Nakanishi	GZ006	-25°06′ 13″	33°43′ 40″	18	Field Crops	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	
5	Gaza	Xai-Xai	11/11/2013	14:25	Kawai and Nakanishi	GZ007	-25°06′ 54″	33°44′ 08″	13	Coastal Forest	Medium	~10m	Open	Good	None	Vegetation	Steep	West	Medium	Brown	Sand	This point is located on top of a sand hill. Indicator species: *Mimusops Caffra* .
6	Gaza	Xai-Xai	12/11/2013	8:41	Kawai and Nakanishi	GZ009	-25°03′ 40″	33°47′ 15″	7	Inundated Grassland	None	~2m	None	None	None	(water)	Flat	None	None	Brown	Sand	A boundary between grassland and tree crops were found. Fruit trees (Trichilia Emetica, Sclerocarya Birrea, Sizyglum Cordatum) were found. This land is permanently inundated.
7	Gaza	Xai-Xai	12/11/2013	9:10	Kawai and Nakanishi	GZ010	-25°00′ 17″	33°48′ 23″	65	Tree Crops	Old	~10m	Open	Good	None	Vegetation	Flat	None	None	Brown	Sand	Caju trees were found.
8	Gaza	Manjacaze	12/11/2013	9:46	Kawai and Nakanishi	GZ011	-24°52′ 57″	33°52′ 18″	103	Tree Crops	Old	~10m	Open	Good	None	Maize, Peanuts	Flat	None	None	Brown	Sand	Fruit trees (Mango, Caju, and Trichilia Emetica) were found. Within this field crop area, signs of regeneration were found.
9	Gaza	Manjacaze	12/11/2013	10:49	Kawai and Nakanishi	GZ012	-24°43′ 05″	33°54′ 12″	66	Inundated Grassland	None	(~2m)	(Dense)	None	None	Bush	Flat	None	None	Brown	Sand	
10	Gaza	Manjacaze	12/11/2013	11:40	Kawai and Nakanishi	GZ013	-24°33′ 44″	33°56′ 05″	46	Inundated Grassland	None	(~5m)	(Dense)	None	None	Bush	Flat	None	None	Brown	Sand	
11	Gaza	Manjacaze	12/11/2013	12:07	Kawai and Nakanishi	GZ014	-24°29′ 29″	33°56′ 38″	46	Grassland	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	Nipa palms were found in this inundated grassland.
12	Gaza	Manjacaze	12/11/2013	12:27	Kawai and Nakanishi	GZ015	-24°26′ 30″	33°57′ 46″	78	Tree Crops	Medium	~10m	Open	Good	None	Vegetation	Flat	None	None	Brown	Sand	Miombo and Caju were found. Tree crops were possibly dominant in this area in the year 2008. Signs of regenetaion were found.
13	Gaza	Manjacaze	12/11/2013	13:39	Kawai and Nakanishi	GZ016	-24°20′ 37″	33°56′ 34″	71	Mecrusse	Medium	~15m	Dense	Good	None	None	Flat	None	None	Brown	Sand	Dense understory vegetation was found.
14	Gaza	Manjacaze	12/11/2013	14:33	Kawai and Nakanishi	GZ017	-24°18′ 25″	33°54′ 56″	68	Mecrusse	Medium	~15m	Medium	Good	None	None	Flat	None	None	Brown	Sand	Dense understory vegetation was found.
15	Gaza	Chibuto	12/11/2013	17:04	Kawai and Nakanishi	GZ022	-24°44′ 14″	33°47′ 24″	80	Tree Crops		~15m										
16	Gaza	Chibuto	12/11/2013	17:18	Kawai and Nakanishi	GZ023	-24°42′ 45″	33°39′ 45″	23	Inundated Grassland		~5m										
17	Gaza	Chibuto	19/11/2013	9:57	Kawai and Nakanishi	GZ024	-24°46′ 43″	33°32′ 33″	14	Shrubland	Medium	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	
18	Gaza	Chibuto	19/11/2013	9:47	Kawai and Nakanishi	GZ025	-24°44′ 07″	33°32′ 30″	12	Grassland	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	This land is partially used for agriculture. This land is temporarily inundated.
19	Gaza	Chibuto	19/11/2013	9:21	Kawai and Nakanishi	GZ026	-24°40′ 31″	33°30′ 30″	11	Grassland	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	This land is temporarily inundated.
20	Gaza	Chibuto	19/11/2013	9:08	Kawai and Nakanishi	GZ027	-24°40′ 26″	33°25′ 29″	11	Grassland	None	(~5m)	None	None	None	None	Flat	None	None	Brown	Sand	This land is inundated during rainy season. Evergreen trees were found.
21	Gaza	Guijá	19/11/2013	8:17	Kawai and Nakanishi	GZ028	-24°33′ 13″	33°09′ 12″	24	Grassland	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	This land is partly used for agriculture while deciduous trees with height of 10m are found sporadically.
22	Gaza	Mabalane	14/11/2013	14:31	Kawai and Nakanishi	GZ029	-24°08′ 24″	32°47′ 27″	58	Mopane	Young	~5m	Open	Good	None	None	Flat	None	None	Brown	Sand	Mopane and shrubs were found in a mixed manner. Aloes were also found sporadically. Shrubs were found at ground level.
23	Gaza	Mabalane	14/11/2013	15:08	Kawai and Nakanishi	GZ030	-24°04′ 05″	32°44′ 18″	74	Mopane	Young	~2m	Medium	Good	None	Grass	Flat	None	None	Brown	Sand	Shrubs were found at ground level.
24	Gaza	Mabalane	14/11/2013	15:33	Kawai and Nakanishi	GZ031	-24°02′ 26″	32°42′ 36″	74	Mopane	Medium	~5m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	Shrubs were found at ground level. Trees without leaves are found from May to October.
25	Gaza	Mabalane	14/11/2013	16:41	Kawai and Nakanishi	GZ033	-23°54′ 31″	32°37′ 53″	88	Mopane	Medium	~5m	Medium	Good	None	None	Flat	None	None	Brown	Sand	Chacoal production is conducted in this area. Trees without leaves were found in July.
26	Gaza	Mabalane	15/11/2013	8:23	Kawai and Nakanishi	GZ034	-23°43′ 47″	32°36′ 59″	103	Mopane	Young	~5m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	
27	Gaza	Mabalane	15/11/2013	8:45	Kawai and Nakanishi	GZ035	-23°40′ 34″	32°36′ 26″	121	Deciduous Forest	Medium 15yrs	~10m	Medium	Good	None	Grass	Flat	None	None	Brown	Sand	
28	Gaza	Mabalane	15/11/2013	9:43	Kawai and Nakanishi	GZ036	-23°29′ 20″	32°34′ 11″	127	Mopane	Young 8-10yrs	~5m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	Regeneration with height of 3-5m was found.
29	Gaza	Mabalane	15/11/2013	10:20	Kawai and Nakanishi	GZ037	-23°26′ 22″	32°33′ 36″	137	Deciduous Woodland	Medium	~10m	Open	Good	None	Vegetation (h=0.5m)	Flat	None	None	Red	Sand	This land was used for field crops with forest. ･Indicator species: *Terminalia Sericea* , *Combretum* , *Acacia* , and *Arbisia* .
30	Gaza	Mabalane	15/11/2013	10:38	Kawai and Nakanishi	GZ038	-23°23′ 31″	32°33′ 03″	138	Field Crops	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	A boundary between field crops and Mopane was found. This land is partly used for agriculture.
31	Gaza	Mabalane	15/11/2013	11:05	Kawai and Nakanishi	GZ039	-23°16′ 08″	32°31′ 40″	151	Deciduous Forest	Medium 20yrs	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	Indicator species: *Arbisia* .
32	Gaza	Chicualacuala	15/11/2013	13:04	Kawai and Nakanishi	GZ040	-23°00′ 46″	32°14′ 10″	203	Deciduous Forest	Medium	~10m	Open	Normal	None	Dried grass	Flat	None	None	Brown	Sand	Shrubs were found. Indicator species: *Combretum* , *Acacia* , and *Chanfuta* .
33	Gaza	Chicualacuala	15/11/2013	13:43	Kawai and Nakanishi	GZ041	-22°52′ 25″	32°07′ 31″	226	Mecrusse	Old 40yrs	~15m	Medium	Normal	None	Dried grass	Flat	None	None	Brown	Sand	Signs of fires were found. Signs of degradation/damages and regeneration were found.
34	Gaza	Chicualacuala	15/11/2013	15:24	Kawai and Nakanishi	GZ042	-22°39′ 46″	32°00′ 51″	259	Deciduous Forest	Medium over 10yrs	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	Thicket and shrubs were found in a mixed manner. Trees with height of 10m were found sporadically.
35	Gaza	Chicualacuala	15/11/2013	15:47	Kawai and Nakanishi	GZ043	-22°35′ 27″	31°57′ 27″	264	Grassland	None	0m	None	None	None	None	Flat	None	None	Brown	Sand	
36	Gaza	Chicualacuala	15/11/2013	16:21	Kawai and Nakanishi	GZ044	-22°28′ 19″	31°53′ 39″	316	Dense Deciduous Thicket	Medium	~5m	Dense	Good	None	Grass	Flat	None	None	Brown	Sand	Shrubs and thickets were found in a mixed manner. Trees have no leaves usually from July to October.
37	Gaza	Chicualacuala	16/11/2013	9:34	Kawai and Nakanishi	GZ045	-22°16′ 06″	31°46′ 02″	410	Dense Deciduous Thicket	Medium	~5m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	Deciduous thickets and shrubs were found in a mixed manner. Trees have no leaves usually from July to October.
38	Gaza	Massangena	17/11/2013	7:48	Kawai and Nakanishi	GZ049	-21°46′ 08″	32°48′ 00″	175	Deciduous Forest	Old 40yrs	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	Open deciduous forest with shrubs was found. Indicator species: *Sclerocarya Birrea* and *BalanitesMaugami* (*Nulo*).
39	Gaza	Massangena	16/11/2013	15:22	Kawai and Nakanishi	GZ051	-21°39′ 48″	32°27′ 53″	314	Dense Deciduous Thicket	Medium 20yrs	~10m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	This land is used as game farm.
40	Gaza	Massangena	16/11/2013	14:32	Kawai and Nakanishi	GZ052	-21°42′ 29″	32°18′ 04″	319	Deciduous Forest	Medium 10yrs	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	
41	Gaza	Massangena	16/11/2013	13:46	Kawai and Nakanishi	GZ053	-21°49′ 59″	32°10′ 46″	320	Deciduous Forest	Medium 15yrs	~10m	Open	Normal	Burned	None	Flat	None	None	Brown	Sand	Signs of recent uncontrolled fires were found.
42	Gaza	Chicualacuala	16/11/2013	11:45	Kawai and Nakanishi	GZ054	-22°03′ 45″	31°58′ 06″	347	Dense Deciduous Thicket	Young 6-7yrs	~5m	Medium	Normal	None	Dried grass	Flat	None	None	Brown	Sand	Deciduous trees were found.
43	Gaza	Chicualacuala	16/11/2013	11:25	Kawai and Nakanishi	GZ055	-22°04′ 52″	31°57′ 01″	321	Mecrusse	Medium	~15m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	This point is located along a river.
44	Gaza	Chicualacuala	16/11/2013	10:53	Kawai and Nakanishi	GZ056	-22°07′ 09″	31°54′ 47″	360	Deciduous Forest	Medium over 20yrs	~15m	Open	Normal	None	Dried grass	Flat	None	None	Brown	Sand	Signs of the past fires that occurred before the year 2012 were found.
45	Gaza	Chicualacuala	16/11/2013	10:00	Kawai and Nakanishi	GZ057	-22°12′ 55″	31°48′ 19″	373	Mecrusse	Medium 10-20yrs	~10m	-	-	-	-	-	-	-	-	-	
46	Gaza	Chigubo	17/11/2013	13:23	Kawai and Nakanishi	GZ058	-22°32′ 14″	33°15′ 22″	87	Mopane	Medium 30yrs	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	This point is located within the Banhine National Park. Mopane and deciduous trees were found in a mixed manner. Baobab trees were also found. Regeneration with height of 3-5m and shrubs were found.
47	Gaza	Chigubo	17/11/2013	12:51	Kawai and Nakanishi	GZ059	-22°25′ 54″	33°12′ 51″	94	Deciduous Forest	Medium 20-30yrs	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	Deciduous forest (partly Mopane) was found. Shrubs were also found sporadically.
48	Gaza	Chigubo	17/11/2013	12:15	Kawai and Nakanishi	GZ060	-22°24′ 00″	33°09′ 49″	89	Mopane	-	~15m	Open	-	Burned	Dried gras(burning)	Flat	None	None	Brown	Sand	Regeneration with height of 2-3m was found.
49	Gaza	Chigubo	17/11/2013	11:41	Kawai and Nakanishi	GZ061	-22°22′ 10″	33°05′ 27″	90	Deciduous Forest	Medium over 30yrs	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	Shrubs were found.
50	Gaza	Chigubo	17/11/2013	15:13	Kawai and Nakanishi	GZ062	-22°17′ 55″	32°52′ 24″	110	Deciduous Forest	Medium 20yrs	~15m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	Indicator species: *Sclerocarya Birrea* , *Combretum* , *Acacia* , and *Nulo* .

Table 6 Results of GT Surveys for Gaza Province (Continued)

UID	Province	District	Date	Time	Surveyor	Point No.	Location			Land Cover	Forest					Understory	Slope			Soil		Comment
							Latitude	Longitude	Elevation		Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	
51	Gaza	Chigubo	17/11/2013	16:01	Kawai and Nakanishi	GZ063	-22°26′ 53″	32°38′ 55″	122	Mopane	Medium 15-20yrs	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	Signs of regeneration were found in a part of this area.
52	Gaza	Chicualacuala	17/11/2013	16:48	Kawai and Nakanishi	GZ064	-22°36′ 04″	32°22′ 55″	145	Mopane	Medium 15yrs	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	Signs of regeneration with height of 2-3m were found.
53	Gaza	Chicualacuala	17/11/2013	17:26	Kawai and Nakanishi	GZ065	-22°43′ 16″	32°10′ 06″	207	Mecrusse	Medium over 20yrs	~10m	Dense	Good	None	None	Flat	None	None	Brown	Sand	
54	Gaza	Chigubo	13/11/2013	14:05	Kawai and Nakanishi	GZ067	-23°32′ 08″	33°22′ 56″	52	Deciduous Forest	Medium	~10m	Dense	Good	None	Grass	Flat	None	None	Brown	Sand	Evergreen trees were found sporadically.
55	Gaza	Chigubo	13/11/2013	13:29	Kawai and Nakanishi	GZ068	-23°42′ 35″	33°17′ 26″	63	Deciduous Forest	Medium	~10m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	Indicator species: *Swartzia Madagascariens* , *Combretum* , and *Sclerocarya Birrea* .
56	Gaza	Guijá	13/11/2013	12:45	Kawai and Nakanishi	GZ069	-23°51′ 01″	33°09′ 34″	62	Evergreen Forest	Medium	~15m	Medium	Good	None	Grass	Flat	None	None	Brown	Sand	
57	Gaza	Guijá	13/11/2013	11:48	Kawai and Nakanishi	GZ070	-23°58′ 07″	33°03′ 46″	57	Deciduous Forest	Medium	~10m	Open	Good	None	Grass and 低木h=2m	Flat	None	None	Brown	Sand	Trees without leaves are usually found from August to the beginning of October.
58	Gaza	Guijá	13/11/2013	10:24	Kawai and Nakanishi	GZ071	-24°10′ 56″	32°59′ 38″	36	Mopane	Young	~5m	Open	Good	None	None	Flat	None	None	Brown	Sand	Re-growth of Mopane trees after charcoal production were found.
59	Gaza	Guijá	14/11/2013	13:00	Kawai and Nakanishi	GZ072	-24°20′ 56″	32°59′ 39″	28	Shrubland	Young	~5m	Open	Normal	None	Grass	Flat	None	None	Brown	Sand	Acacia trees were found. Shrubs and thickets were found in a mixed manner.
60	Gaza	Xai-Xai	11/11/2013	15:30	Kawai and Nakanishi	GZ073	-25°06′ 22″	33°46′ 02″	6	Coastal Forest	Medium	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	Indiator species: Casulianas with height of 5-10m.
61	Gaza	Manjacaze	12/11/2013	10:20	Kawai and Nakanishi	GZ074	-24°49′ 57″	33°52′ 49″	104	Deciduous Forest	Young	~5m	Medium	Good	None	Vegetation	Flat	None	None	Brown	Sand	Young Miombo trees were found. Tree crops and Miombo trees will be eventually found in a mixed manner.
62	Gaza	Manjacaze	12/11/2013	12:55	Kawai and Nakanishi	GZ075	-24°25′ 45″	33°57′ 35″	82	Deciduous Forest	Medium	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	Caju trees are found sporadically.
63	Gaza	Manjacaze	12/11/2013	15:15	Kawai and Nakanishi	GZ076	-24°21′ 03″	33°57′ 38″	79	Mecrusse	Old	~20m	Dense	Good	None	Vegetation	Flat	None	None	Brown	Sand	
64	Gaza	Guijá	13/11/2013	12:24	Kawai and Nakanishi	GZ077	-23°52′ 22″	33°07′ 51″	62	Evergreen Forest	Old	~15m	Medium	Good	None	Grass	Flat	None	None	Brown	Sand	
65	Gaza	Mabalane	14/11/2013	16:15	Kawai and Nakanishi	GZ078	-23°57′ 13″	32°38′ 30″	88	Deciduous Forest	Medium	~10m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	Boundary between Deciduous (North) and Mopane (South) was found. Indicator species: *Terminalia Sericea* and *Combretum* .
66	Gaza	Mabalane	15/11/2013	8:58	Kawai and Nakanishi	GZ079	-23°40′ 39″	32°38′ 25″	121	Mopane												
67	Gaza	Mabalane	15/11/2013	11:20	Kawai and Nakanishi	GZ080	-23°14′ 34″	32°31′ 15″	151	Mecrusse	Old over 40yrs	~10m	Dense	Good	None	None	Flat	None	None	Brown	Sand	
68	Gaza	Chicualacuala	15/11/2013	12:40	Kawai and Nakanishi	GZ081	-23°04′ 04″	32°17′ 38″	184	N/a	Young	~2m	Open	Normal	None	None	Gentle	West	Medium	Brown	Medium	Low Mecruse trees were found. Deciduous trees were found below a cliff to the west of this point.
69	Gaza	Chicualacuala	15/11/2013	16:03	Kawai and Nakanishi	GZ082	-22°33′ 28″	31°56′ 55″	284	Shrubland	Medium	~5m	Open	Good	None	None	Flat	None	None	Brown	Sand	Deciduous shrubs were found at this point.
70	Gaza	Massangena	12/11/2013	7:31	Kawai and Nakanishi	GZ083	-21°26′ 50″	32°28′ 14″	-	Tree Crops												
71	Gaza	Xai-Xai	11/11/2013	15:13	Kawai and Nakanishi	GZ084	-25°05′ 53″	33°47′ 12″	3	Sand												Ground was covered by sand. This point is located on steep slope.
72	Gaza	Massangena	12/11/2013	8:59	Kawai and Nakanishi	GZ085	-21°24′ 15″	32°27′ 53″	-	Tree Crops												
73	Gaza	Manjacaze	12/11/2013	11:29	Kawai and Nakanishi	GZ086	-24°35′ 02″	33°54′ 56″	-	Tree Crops		~5m										
74	Gaza	Manjacaze	12/11/2013	11:50	Kawai and Nakanishi	GZ087	-24°32′ 15″	33°56′ 20″	46	Grassland												This land is used as grazing land.
75	Gaza	Manjacaze	12/11/2013	15:25	Kawai and Nakanishi	GZ088	-24°21′ 35″	33°57′ 39″	-	Deciduous Forest												
76	Gaza	Guijá	19/11/2013	7:33	Kawai and Nakanishi	GZ089	-24°31′ 10″	33°04′ 24″	-	Inundated Grassland												
77	Gaza	Guijá	19/11/2013	8:28	Kawai and Nakanishi	GZ090	-24°33′ 48″	33°10′ 33″	-	Shrubland		~2m										
78	Gaza	Chibuto	19/11/2013	8:55	Kawai and Nakanishi	GZ091	-24°39′ 23″	33°18′ 47″	-	Grassland												This land is partially inundated.
79	Gaza	Chibuto	18/11/2013	13:12	Kawai and Nakanishi	GZ092	-24°39′ 23″	33°18′ 47″	-	Grassland												Trees and shrubs were found sporadically.
80	Gaza	Guijá	14/11/2013	14:18	Kawai and Nakanishi	GZ093	-24°11′ 04″	32°48′ 56″	-	Mopane		~5m										
81	Gaza	Mabalane	14/11/2013	16:54	Kawai and Nakanishi	GZ094	-23°53′ 09″	32°37′ 43″	-	Deciduous Forest		~5m										
82	Gaza	Mabalane	15/11/2013	9:53	Kawai and Nakanishi	GZ095	-23°29′ 19″	32°34′ 07″	126	Grassland												Shrubs with height of 2m and young Mopane trees with height of 10m were found.
83	Gaza	Massangena	16/11/2013	16:40	Kawai and Nakanishi	GZ096	-21°26′ 50″	32°28′ 14″	210	Mopane												
84	Gaza	Chibuto	16/11/2013	16:51	Kawai and Nakanishi	GZ097	-24°39′ 23″	33°18′ 47″	246	Mopane												
85	Gaza	Massangena	16/11/2013	15:03	Kawai and Nakanishi	GZ098	-21°37′ 38″	32°22′ 51″	-	Mecrusse												
86	Gaza	Massangena	16/11/2013	13:59	Kawai and Nakanishi	GZ099	-21°48′ 03″	32°12′ 40″	-	Mecrusse												
87	Gaza	Massangena	16/11/2013	14:12	Kawai and Nakanishi	GZ100	-21°45′ 37″	32°15′ 05″	-	Mopane												
88	Gaza	Chicualacuala	16/11/2013	12:10	Kawai and Nakanishi	GZ101	-21°59′ 29″	32°02′ 17″	-	Mecrusse												
89	Gaza	Chicualacuala	16/11/2013	12:14	Kawai and Nakanishi	GZ102	-21°59′ 07″	32°02′ 38″	-	Deciduous Forest												
90	Gaza	Chicualacuala	16/11/2013	12:17	Kawai and Nakanishi	GZ103	-21°58′ 36″	32°03′ 08″	-	Grassland												
91	Gaza	Massangena	16/11/2013	13:30	Kawai and Nakanishi	GZ104	-21°53′ 01″	32°07′ 48″	-	Mecrusse												
92	Gaza	Chigubo	17/11/2013	13:46	Kawai and Nakanishi	GZ105	-22°26′ 54″	33°13′ 08″	-	Mopane		~10m	Open									
93	Gaza	Chigubo	17/11/2013	13:57	Kawai and Nakanishi	GZ106	-22°24′ 12″	33°10′ 34″	-	Mopane		~10m	Open									
94	Gaza	Chigubo	17/11/2013	14:07	Kawai and Nakanishi	GZ107	-22°22′ 55″	33°06′ 54″	-	Mopane												
95	Gaza	Chigubo	17/11/2013	15:29	Kawai and Nakanishi	GZ108	-22°20′ 42″	32°48′ 14″	-	Mecrusse												
96	Gaza	Guijá	13/11/2013	11:59	Kawai and Nakanishi	GZ109	-23°57′ 49″	33°03′ 49″	-	Deciduous Forest												
97	Gaza	Guijá	13/11/2013	12:01	Kawai and Nakanishi	GZ110	-23°57′ 35″	33°03′ 58″	-	Deciduous Forest												
98	Gaza	Guijá	13/11/2013	9:41	Kawai and Nakanishi	GZ111	-24°18′ 58″	32°54′ 36″	-	Shrubland												
99	Gaza	Guijá	13/11/2013	9:46	Kawai and Nakanishi	GZ112	-24°17′ 40″	32°55′ 25″	-	Mopane												
100	Gaza	Guijá	13/11/2013	9:54	Kawai and Nakanishi	GZ113	-24°15′ 16″	32°56′ 46″	-	Deciduous Forest												
101	Gaza	Guijá	13/11/2013	10:41	Kawai and Nakanishi	GZ114	-24°09′ 33″	33°00′ 27″	-	Deciduous Forest												
102	Gaza	Guijá	13/11/2013	10:43	Kawai and Nakanishi	GZ115	-24°09′ 01″	33°00′ 48″	-	Mopane												
103	Gaza	Guijá	13/11/2013	11:04	Kawai and Nakanishi	GZ116	-24°07′ 14″	33°01′ 28″	-	Mopane		~10m										
104	Gaza	Guijá	13/11/2013	11:06	Kawai and Nakanishi	GZ117	-24°06′ 59″	33°01′ 33″	-	Decidous Forest												This point is located along a river.
105	Gaza	Guijá	13/11/2013	11:33	Kawai and Nakanishi	GZ118	-24°00′ 12″	33°02′ 35″	-	Grassland												

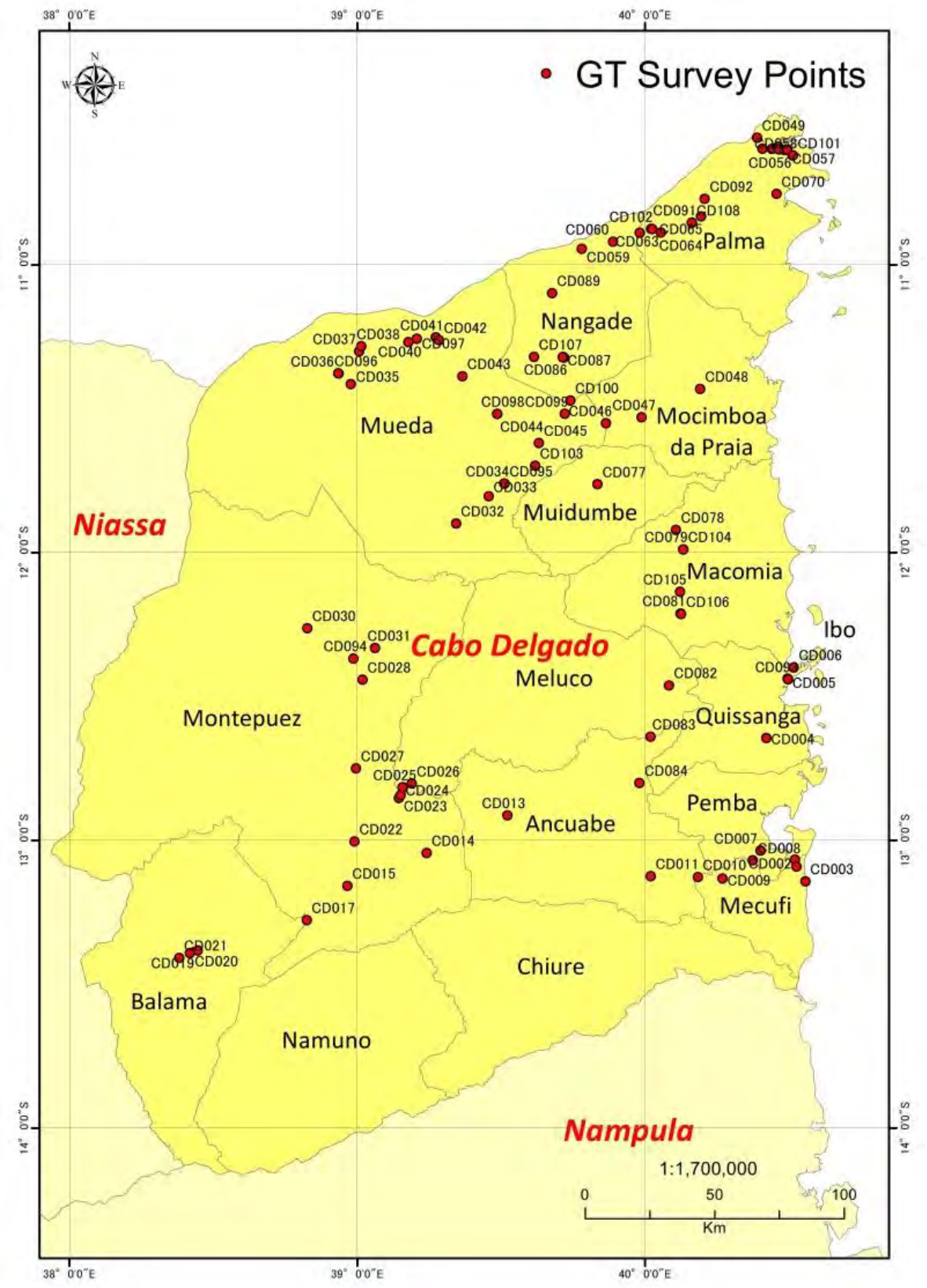

Figure 4 GT Survey Points in Cabo Delgado Province

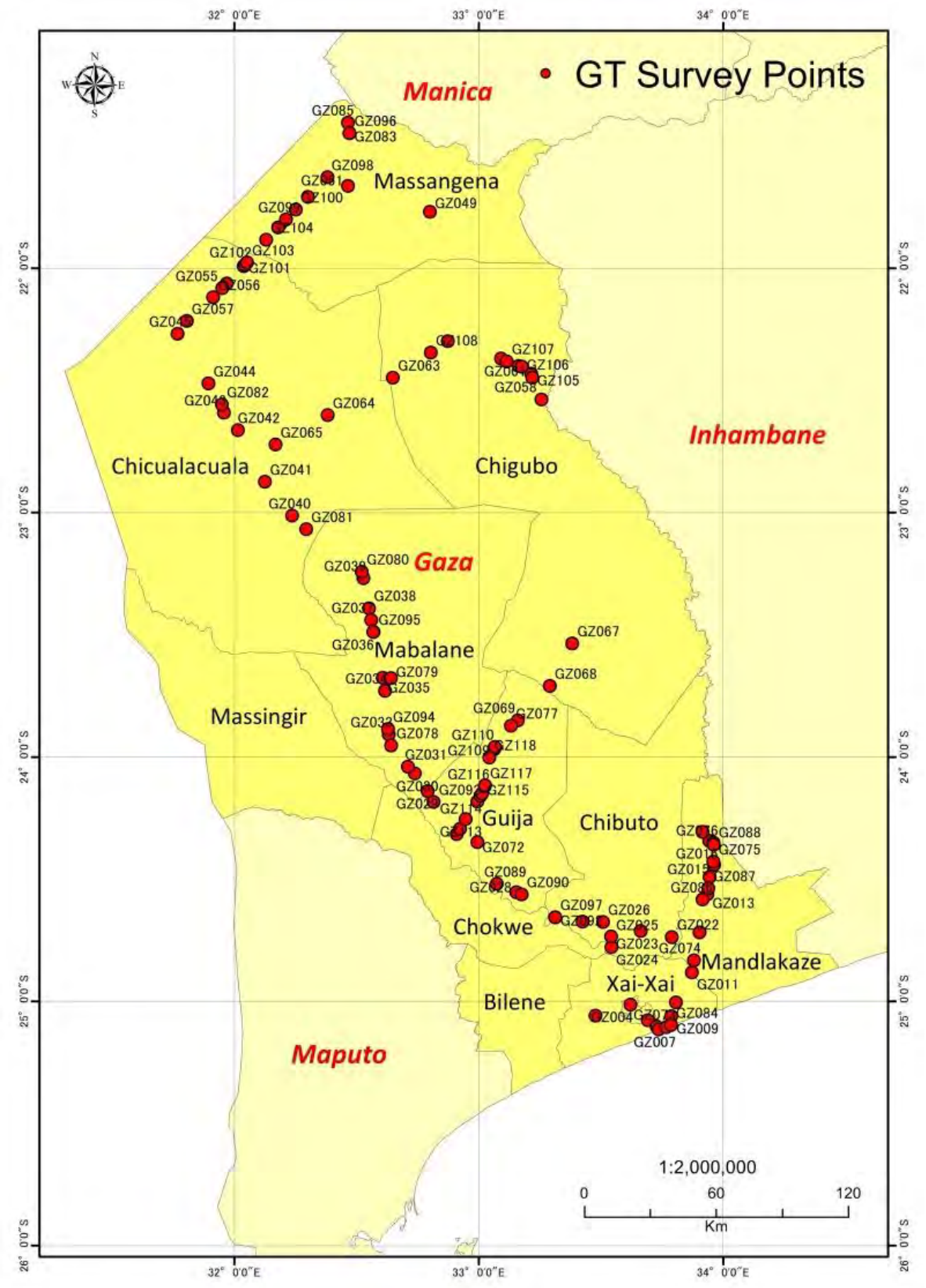

Figure 5 GT Survey Points in Gaza Province

（3）Implementation of Additional Ground Truth Surveys

In order to correct misclassifications in the forest-cover maps and also to check areas where features of optical satellite imagery were unclear, additional GT surveys were conducted.

1）Gaza Province

Survey points of the additional GT survey in Gaza Province are shown in Figure 6, and the survey results are summarized in Table 5. The following shows main objectives of this additional GT survey.

- To examine classification results of mopane and (semi-)deciduous forests.
- To examine classification results of (semi-)evergreen and (semi-)deciduous forests.
- To examine classification results of (semi-)deciduous forests and thickets.
- To examine extents/areas of grasslands.
- To examine areas covered by thin clouds.

2）Cabo Delgado Province

Survey points of the additional GT survey in Cabo Delgado Province are shown in Figure7 , and the survey results are summarized in Table 6. The following shows main objectives of this additional GT survey.

- To examine classification results of (semi-)evergreen and (semi-)deciduous forests.
- To examine classification results of (semi-)deciduous forests and thickets.
- To examine classification results of grasslands and open (semi-)deciduous forests.
- To check extents/areas of thickets.
- To examine classification results of tree crops and field crops.

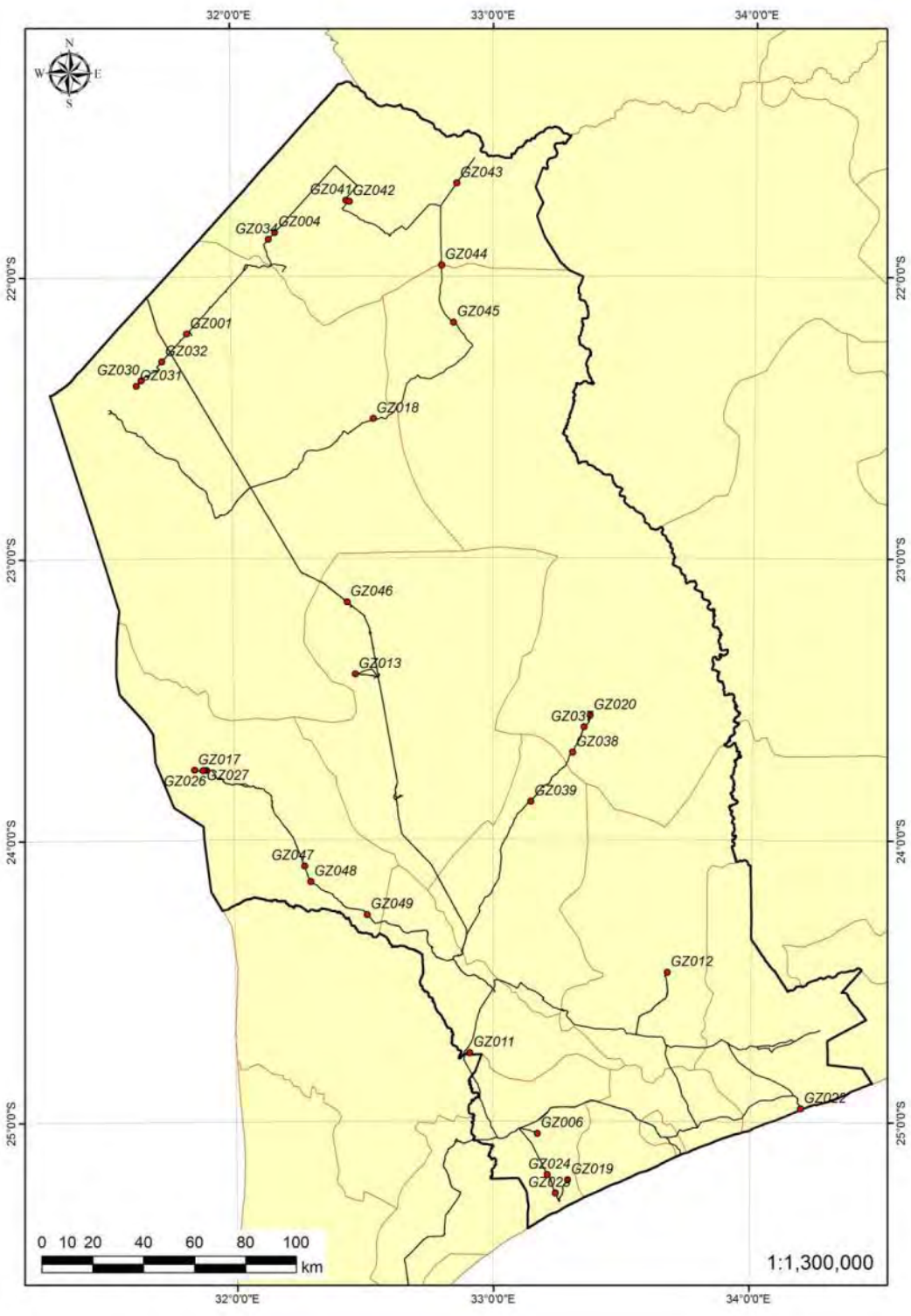

Figure 6: Additional GT Survey Points in Gaza Province

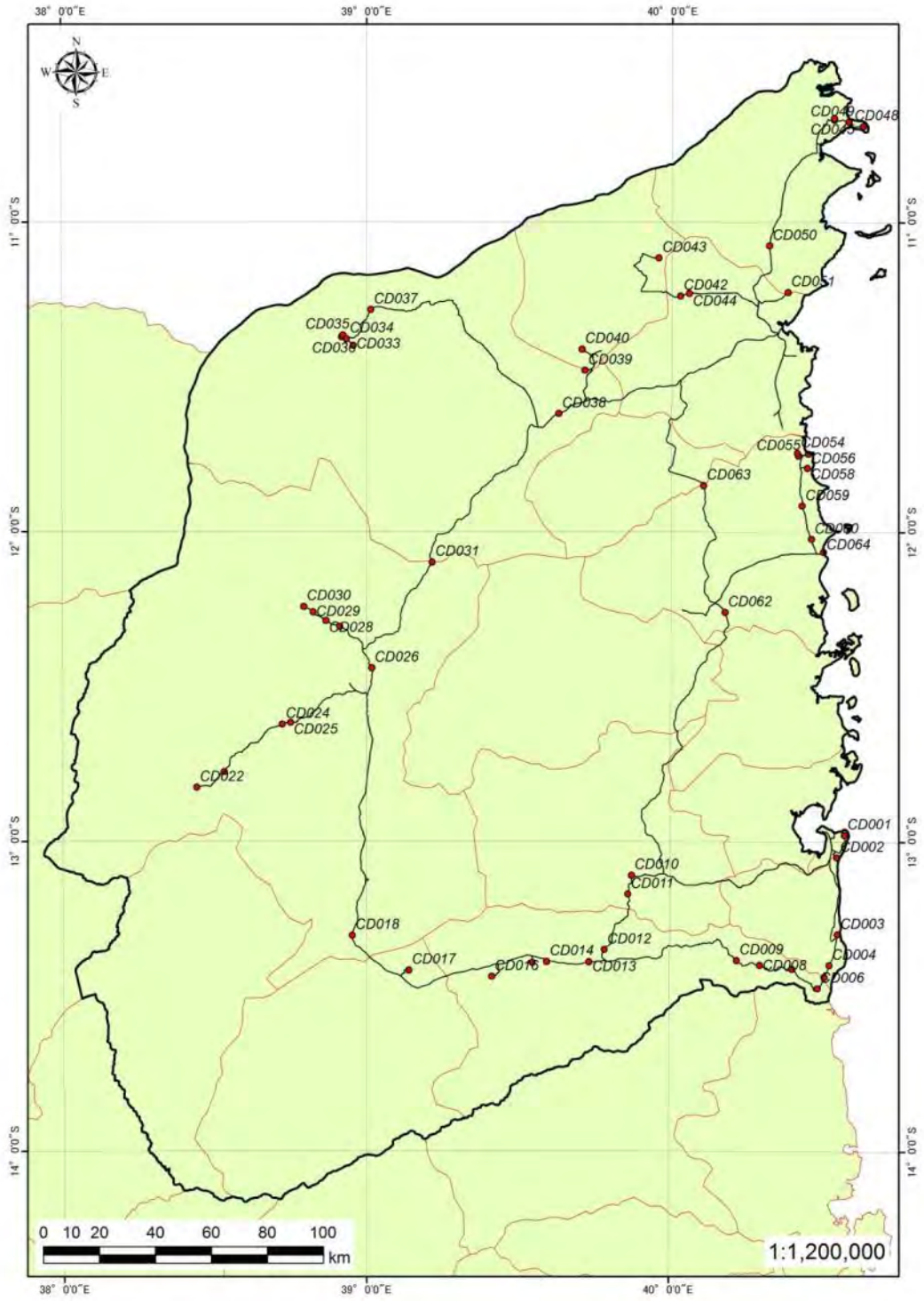

Figure 7 Additional GT Survey Points in Cabo Delgado Province

Table 5 Results of Additional GT Surveys in Gaza Province

UID	Province	District	Date	Time	Surveyor	Point No.	Latitude (N)	Longitude (E)	Elevation (m)	Forest Type in Field						Understory	Slope			Soil		Photo No							Comments 1	Comments 2 (Spices)
										General	Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	North	East	South	West	Above	Ground	Distance View	Near View		
1	Gaza	Chicualacuala	2014/5/26	8:57	Kawai	GZ001	-22°12'13"	31°49'49"	370	Thicket	Old	~5m	Dense	Good	None	Grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00248.JPG	DSC00249.JPG	Poor soil area.	
2	Gaza	Massangena	2014/5/26	13:38	Kawai	GZ004	-21°50'39"	32°10'06"	305	Deciduous	Young	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00267.JPG	DSC00268.JPG	The site of Shifting Cultivation.	
3	Gaza	Bilene	2014/5/22	12:31	Kawai	GZ006	-25°02'38"	33°10'16"	74	Thicket	Old	~10m	Medium	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00105.JPG	DSC00106.JPG	DSC00107.JPG	DSC00108.JPG	DSC00109.JPG	DSC00110.JPG	-	-	Regrowth Semi-deciduous Thicket. Formar settlement area. Caju trees (DSC00112.JPG) also found.	*Albizzia versicolor* (DSC00114.JPG), *Albizzia adiantifolia* , *Tabernaemontana elegansi* , *Strichnos spinosa* , *Trichilia emetica* (DSC00115.JPG), *Vangueira infausta* (DSC00116.JPG)
4	Gaza	Chokwe	2014/5/22	16:14	Kawai	GZ011	-24°45'28"	32°54'33"	29	Scrubland	Old	~5m	Medium	Good	None	None	Flat	None	None	Brown	Sand	DSC00121.JPG	DSC00122.JPG	DSC00123.JPG	DSC00124.JPG	DSC00125.JPG	DSC00126.JPG	-	-		*Combretum* , *Acacia* , *Terminalia sericia* (DSC00127.JPG), *Sclerocaria birrea*
5	Gaza	Chibuto	2014/5/29	14:37	Kawai	GZ012	-24°28'15"	33°40'31"	93	Scrubland	Medium	~5m	Medium	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00477.JPG	DSC00478.JPG	DSC00479.JPG	DSC00480.JPG	DSC00481.JPG	DSC00482.JPG	DSC00483.JPG	DSC00484.JPG	Formar Agricultural area (sometimes fired).	*Strychunus madascariensis* , *Garcinia Livingstoneis* , *Albizzia versicolor* , *Combretum* , *Afzelia Quanzensis*
6	Gaza	Mabalane	2014/5/24	11:47	Kawai	GZ013	-23°24'47"	32°28'09"	125	Mopane	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00189.JPG	DSC00190.JPG	DSC00191.JPG	DSC00192.JPG	DSC00193.JPG	DSC00194.JPG	DSC00199.JPG	-	Mopane (DSC00195, 196.JPG). Partly Combretum.	*Sclerocarya* , *Combretum*
7	Gaza	Massingir	2014/5/28	14:13	Kawai	GZ017	-23°45'06"	31°50'52"	303	Mopane	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Cray	Sand	DSC00396.JPG	DSC00397.JPG	DSC00398.JPG	DSC00399.JPG	DSC00400.JPG	DSC00401.JPG	DSC00402.JPG	DSC00403.JPG	Original Mopane Forest.	
8	Gaza	Chicualacuala	2014/5/27	12:15	Kawai	GZ018	-22°30'24"	32°32'26"	119	Mopane	Young	~3m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00335.JPG	DSC00336.JPG	DSC00337.JPG	DSC00338.JPG	DSC00339.JPG	DSC00340.JPG	DSC00341.JPG	DSC00342.JPG	Regrowth Mopane Forest. Formar settlement and Agricultural area.	
9	Gaza	Bilene	2014/5/22	11:17	Kawai	GZ019	-25°12'31"	33°17'22"	52	Grassland with Trees	-	0m	Open	-	None	None	Gentle	NEE	Medium	Brown	Sand	DSC00091.JPG	DSC00092.JPG	DSC00093.JPG	DSC00094.JPG	DSC00095.JPG	DSC00096.JPG	-	-		*Sizygium cordatum* , *Garcinia Livingstoney* , *Albizzia versicolor* (All spicies are Deciduous. Below 10m)
10	Gaza	Chigubo	2014/5/23	12:53	Kawai	GZ020	-23°33'35"	33°22'26"	56	Deciduous	Old	~15m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00176.JPG	DSC00177.JPG	DSC00178.JPG	DSC00179.JPG	DSC00180.JPG	DSC00181.JPG	DSC00183.JPG	DSC00185.JPG		*Combretum* , *Acacia*
11	Gaza	Manjacaze	2014/5/21	14:30	Kawai	GZ022	-24°57'10"	34°11'46"	23	Thicket (Evergreen)	Old	~5m	Dense	Good	None	None	Medium	NW	Medium	Brown	Sand	DSC00037.JPG	DSC00038.JPG	DSC00039.JPG	DSC00040.JPG	DSC00041.JPG	DSC00042.JPG	-	-		*Ninusops*
12	Gaza	Bilene	2014/5/22	10:16	Kawai	GZ023	-25°15'20"	33°14'29"	39	Plantation	Old	~25m	Open	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC00064.JPG	DSC00065.JPG	DSC00066.JPG	DSC00067.JPG	DSC00068.JPG	DSC00069.JPG	DSC00074.JPG	DSC00075.JPG		*Eucaliptus*
13	Gaza	Bilene	2014/5/22	9:49	Kawai	GZ024	-25°11'25"	33°12'36"	46	Evergreen	Old	~10m	Medium	Good	None	Bush	Flat	None	None	Brown	Sand	DSC00051.JPG	DSC00052.JPG	DSC00053.JPG	DSC00054.JPG	DSC00055.JPG	DSC00056.JPG	-	-	Evergreen Open Forest.	*Diallium scklecrteri* (DSC00057.JPG), *Morus lactea* (DSC00058.JPG), *Albizzia adiantifolia* (DSC00059.JPG), *Strichnos spinosa* (DSC00061.JPG) (All Evergreen Spicies)
14	Gaza	Massingir	2014/5/28	13:28	Kawai	GZ025	-23°45'09"	31°53'40"	256	Mopane	Medium	~10m	Open	Good	None	Dried grass	Flat	None	None	Cray	Sand	DSC00364.JPG	DSC00365.JPG	DSC00366.JPG	DSC00367.JPG	DSC00368.JPG	DSC00369.JPG	DSC00370.JPG	DSC00371.JPG	Withered Mopane (DSC00372, 373.JPG)	*Mopane* , *Combretum*
15	Gaza	Massingir	2014/5/28	13:42	Kawai	GZ026	-23°45'10"	31°53'09"	260	Mopane	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Cray	Sand	DSC00374.JPG	DSC00375.JPG	DSC00376.JPG	DSC00377.JPG	DSC00378.JPG	DSC00379.JPG	DSC00380.JPG	DSC00381.JPG	Mopane Forest from way back. Additional photos are available (DSC00382-384.JPG).	
16	Gaza	Massingir	2014/5/28	13:55	Kawai	GZ027	-23°45'12"	31°52'49"	265	Mopane	Medium	~10m	Open	Good	None	Dried grass	Flat	None	None	Cray	Sand	DSC00387.JPG	DSC00388.JPG	DSC00389.JPG	DSC00390.JPG	DSC00391.JPG	DSC00392.JPG	DSC00394.JPG	DSC00395.JPG	Logging area for firewood and building materials. This area was protected 2 years ago. (by renger)	
17	Gaza	Chicualacuala	2014/5/24	15:41	Kawai	GZ030	-22°22'05"	31°39'21"	223	Mecrusse	Old	~10m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00215.JPG	DSC00216.JPG	Other pictires (DSC00217, 218.JPG)	
18	Gaza	Chicualacuala	2014/5/24	15:59	Kawai	GZ031	-22°23'14"	31°38'12"	195	Mopane	Old	~10m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00219.JPG	DSC00220.JPG		
19	Gaza	Chicualacuala	2014/5/24	14:56	Kawai	GZ032	-22°18'05"	31°44'04"	407	Thicket	Old	~5m	Dense	Good	None	Grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00213.JPG	DSC00214.JPG	Maybe Typical Thicket.	
20	Gaza	Massangena	2014/5/26	13:21	Kawai	GZ034	-21°52'10"	32°08'39"	325	Thicket	Young	~3m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00261.JPG	DSC00262.JPG	Regrowth Thicket (Burned?).	*Boscia albitrunca* (DSC00263.JPG)
21	Gaza	Chigubo	2014/5/23	12:30	Kawai	GZ037	-23°36'06"	33°21'01"	57	Deciduous	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00164.JPG	DSC00165.JPG	DSC00166.JPG	DSC00167.JPG	DSC00168.JPG	DSC00169.JPG	DSC00173.JPG	DSC00171.JPG		*Acacia* , *Guibourtia conjugata* , *Spirostachys africana* , *Boscia albitrunca*
22	Gaza	Chigubo	2014/5/23	12:06	Kawai	GZ038	-23°41'28"	33°18'22"	60	Deciduous	Old	~10m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00153.JPG	DSC00154.JPG	DSC00155.JPG	DSC00156.JPG	DSC00157.JPG	DSC00158.JPG	-	-		*Combretum mole* , *Pseudolsnaustile* , *Naplonifolia*
23	Gaza	Guijá	2014/5/23	11:08	Kawai	GZ039	-23°51'55"	33°08'43"	60	Deciduous	Old	~10m	Open	Good	Burned	Grass	Flat	None	None	Brown	Sand	DSC00136.JPG	DSC00137.JPG	DSC00138.JPG	DSC00139.JPG	DSC00140.JPG	DSC00141.JPG	-	-		*Combretum mole* (DSC00142.JPG), *Guibourtia conjugata* (DSC00143, 144.JPG), *Balanites Naugani* (DSC00145, 146.JPG), *Sclerocarya birrea* , *Spirostachys africana* , *Strichnos madagascariensis*
24	Gaza	Massangena	2014/5/26	16:21	Kawai	GZ041	-21°43'51"	32°26'23"	276	Evergreen	Old	~15m	Medium	Good	None	None	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00279.JPG	DSC00280.JPG	Distant view photo (DSC00282.JPG)	*Brachystegia bussei*
25	Gaza	Massangena	2014/5/26	16:38	Kawai	GZ042	-21°44'05"	32°27'08"	282	Mecrusse	-	~5m	Open	Death	Burned	Dried grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC00285.JPG	DSC00286.JPG	Shifting Cultivation. Because Mecrusse forest areas are generaly good for agriculture, these areas are often burnt for future agriculture use.	
26	Gaza	Massangena	2014/5/27	8:59	Kawai	GZ043	-21°40'13"	32°51'38"	164	Evergreen	Old	~20m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00300.JPG	DSC00301.JPG	DSC00302.JPG	DSC00303.JPG	DSC00304.JPG	DSC00305.JPG	DSC00306.JPG	DSC00307.JPG	Shifting Cultivation with Forest. Power transmission lines were under construction in parallel with roads.	*Guibourtia conjugata* (DSC00298, 299.JPG), *Terminalia*
27	Gaza	Massangena	2014/5/27	9:51	Kawai	GZ044	-21°57'42"	32°48'10"	144	Miombo	Old	~20m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00311.JPG	DSC00312.JPG	DSC00313.JPG	DSC00314.JPG	DSC00315.JPG	DSC00316.JPG	DSC00309.JPG	DSC00310.JPG	Transition to Miombo. On the photo (DSC00318.JPG), Miombo (DSC00319.JPG) is shown on the left, and Mopane (DSC00320.JPG) is shown on the right.	*Brachystegia* (Miombo), *Acacia* , *Mopane* , *Terminalia sericea* , *Combretum*
28	Gaza	Chigubo	2014/5/27	10:35	Kawai	GZ045	-22°09'51"	32°50'55"	116	Deciduous	Old	~15m	Open	Good	None	Regrowth Vegetation	Flat	None	None	Brown	Sand	DSC00322.JPG	DSC00323.JPG	DSC00324.JPG	DSC00325.JPG	DSC00326.JPG	DSC00327.JPG	DSC00328.JPG	DSC00329.JPG	Some trees are Mopane. Other species of Acacia (DSC00331, 332.JPG).	
29	Gaza	Mabalane	2014/5/27	15:15	Kawai	GZ046	-23°09'25"	32°26'18"	168	Mopane	Young	~3m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00349.JPG	DSC00350.JPG	DSC00351.JPG	DSC00352.JPG	DSC00353.JPG	DSC00354.JPG	DSC00355.JPG	DSC00356.JPG	Though tree height is low, this was not a regrowth mopane. This was probably due to poor soil conditions.	
30	Gaza	Massingir	2014/5/29	10:15	Kawai	GZ047	-24°05'38"	32°16'14"	149	Mopane	Young	~3m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00415.JPG	DSC00416.JPG	DSC00417.JPG	DSC00418.JPG	DSC00419.JPG	DSC00420.JPG	DSC00421.JPG	DSC00422.JPG	Logging for Chacoal production and Shifting Cultivation. Regrowth Mopane (3-4 years old). But Mopane Forest 6 years ago.	
31	Gaza	Massingir	2014/5/29	10:49	Kawai	GZ048	-24°08'56"	32°17'39"	153	Scrubland	Medium	~5m	Medium	Good	None	None	Flat	None	None	Brown	Sand	DSC00426.JPG	DSC00427.JPG	DSC00428.JPG	DSC00429.JPG	DSC00430.JPG	DSC00431.JPG	DSC00432.JPG	DSC00433.JPG		
32	Gaza	Massingir	2014/5/29	11:19	Kawai	GZ049	-24°16'01"	32°30'45"	106	Mopane	Medium	~5m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00437.JPG	DSC00438.JPG	DSC00439.JPG	DSC00440.JPG	DSC00441.JPG	DSC00442.JPG	DSC00443.JPG	DSC00444.JPG	Mopane and Scrubland (Mixed Forest).	

Table 6 Results of Additional GT Surveys in Cabo Delgado Province

UID	Province	District	Date	Time	Surveyor	Point No.	Latitude (N)	Longitude (E)	Elevation (m)	Forest Type in Field						Understory	Slope			Soil		Photo No								Comments 1	Comments 2 (Spices)
										General	Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	North	East	South	West	Above	Ground	Distance View	Near View		
1	Cabo Delgado	Pemba	2014/6/10	14:07	Kawai	CD001	-12°58'41"	40°34'29"	19	Tree Crops	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00503.JPG	DSC00504.JPG	DSC00505.JPG	DSC00506.JPG	DSC00507.JPG	DSC00508.JPG	DSC00509.JPG	DSC00510.JPG	Caju Trees.	
2	Cabo Delgado	Mecúfi	2014/6/10	13:14	Kawai	CD002	-13°03'03"	40°33'02"	13	Thicket (Deciduous)	Young	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC00490.JPG	DSC00491.JPG	DSC00492.JPG	DSC00493.JPG	DSC00494.JPG	DSC00495.JPG	DSC00499.JPG	DSC00500.JPG	Regrowth Deciduous Thicket. Shifting Cultivation area.	
3	Cabo Delgado	Mecúfi	2014/6/11	11:08	Kawai	CD003	-13°17'57"	40°33'14"	15	Tree Crops	Old 30yrs	~15m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC00524.JPG	DSC00525.JPG	DSC00526.JPG	DSC00527.JPG	DSC00528.JPG	DSC00529.JPG	DSC00530.JPG	DSC00531.JPG	Caju Trees.	
4	Cabo Delgado	Mecúfi	2014/6/11	11:38	Kawai	CD004	-13°23'55"	40°31'37"	2	Grassland	None	0m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC00532.JPG	DSC00533.JPG	DSC00534.JPG	DSC00535.JPG	DSC00536.JPG	DSC00537.JPG	DSC00539.JPG	-		
5	Cabo Delgado	Mecúfi	2014/6/11	12:03	Kawai	CD005	-13°26'16"	40°30'37"	8	Field Crops	None	~3m	Medium	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC00544.JPG	DSC00545.JPG	DSC00546.JPG	DSC00547.JPG	DSC00548.JPG	DSC00549.JPG	DSC00552.JPG	-	Permanent Agricultural area. High moisture soil. Some trees remained. These trees were not mango nor caju.	*Cassava, Maize*
6	Cabo Delgado	Chiúre	2014/6/11	12:30	Kawai	CD006	-13°28'25"	40°29'16"	44	Deciduous	Old 20-30	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00553.JPG	DSC00554.JPG	DSC00555.JPG	DSC00556.JPG	DSC00557.JPG	DSC00558.JPG	DSC00561.JPG	DSC00562.JPG	This area was agriculture land 20 - 30 years ago. This was not an original forest.	*Sclerocarya birrea, Combretum, Dalbergia melanoxylon, Stercylia quinqueloba*
7	Cabo Delgado	Chiúre	2014/6/11	13:00	Kawai	CD007	-13°24'39"	40°24'15"	79	Deciduous	Old 50yrs	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00567.JPG	DSC00568.JPG	DSC00569.JPG	DSC00570.JPG	DSC00571.JPG	DSC00572.JPG	DSC00575.JPG	DSC00576.JPG	Deciduous Forest with Scrub.	
8	Cabo Delgado	Chiúre	2014/6/11	13:33	Kawai	CD008	-13°23'56"	40°17'50"	218	Deciduous	Medium 2	~15m	Dense	Good	None	Small vegetation	Gentle	NE	Medium	Brown	Sand	DSC00576.JPG	DSC00577.JPG	DSC00578.JPG	DSC00579.JPG	DSC00580.JPG	DSC00581.JPG	DSC00583.JPG	DSC00584.JPG		*Milletia sthulmannii, Diplorinchys condilocarpon, Dalbergia melanoxinor*
9	Cabo Delgado	Chiúre	2014/6/11	14:04	Kawai	CD009	-13°23'01"	40°13'17"	204	Miombo (Deciduous)	Young 5-7	~10m	Dense	Good	None	Vegetation	Gentle	S	Short	Brown	Small	DSC00586.JPG	DSC00587.JPG	DSC00588.JPG	DSC00589.JPG	DSC00590.JPG	DSC00591.JPG	DSC00592.JPG	DSC00593.JPG	Regrowth Miombo. Shifting Cultivation. Miombo/Deciduous transition Forest.	*Brachystegia bohemii, Brachystegia spiciformis, Milletia sthulmannii, Dalbergia melanoxylon*
10	Cabo Delgado	Ancuabe	2014/6/12	9:45	Kawai	CD010	-13°06'32"	39°52'25"	369	Tree Crops	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00614.JPG	DSC00615.JPG	DSC00616.JPG	DSC00617.JPG	DSC00618.JPG	DSC00619.JPG	DSC00620.JPG	DSC00621.JPG	Caju Trees.	
11	Cabo Delgado	Ancuabe	2014/6/12	10:07	Kawai	CD011	-13°10'13"	39°51'42"	294	Deciduous	Young 10y	~10m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00627.JPG	DSC00628.JPG	DSC00629.JPG	DSC00630.JPG	DSC00631.JPG	DSC00632.JPG	DSC00633.JPG	DSC00634.JPG	Changing from Thicket to Deciduous Forest. People left this area 10 years ago.	
12	Cabo Delgado	Chiúre	2014/6/11	15:36	Kawai	CD012	-13°20'58"	39°47'05"	339	Tree Crops	Old 20yrs	~15m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00595.JPG	DSC00596.JPG	DSC00597.JPG	DSC00598.JPG	DSC00599.JPG	DSC00600.JPG	DSC00605.JPG	DSC00606.JPG	Permanent Agricultural area.	*Caju and Mango (DSC00601.JPG), Cassava (DSC00602.JPG) and Sorgum (DSC00603-604.JPG), Maize*
13	Cabo Delgado	Chiúre	2014/6/12	11:15	Kawai	CD013	-13°23'22"	39°44'04"	325	Field Crops/Tree Crops	Old	~15m	Open	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC00643.JPG	DSC00644.JPG	DSC00645.JPG	DSC00646.JPG	DSC00647.JPG	DSC00648.JPG	DSC00654.JPG	DSC00655.JPG	Permanent FC/TC area.	*Caju (DSC00651.JPG) and Mango (DSC00652.JPG), Maize, Beans, Millet, Cassava*
14	Cabo Delgado	Chiúre	2014/6/12	12:09	Kawai	CD014	-13°23'19"	39°35'41"	390	Field Crops	Young	~3m	Open	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC00668.JPG	DSC00669.JPG	DSC00670.JPG	DSC00671.JPG	DSC00672.JPG	DSC00673.JPG	DSC00682.JPG	DSC00683.JPG	In 2008, it may be the Forest. Now, here is a shifting cultivation area.	*Maize, Cassava, Local beans*
15	Cabo Delgado	Chiúre	2014/6/12	12:52	Kawai	CD015	-13°23'29"	39°32'50"	374	Grassland	None	~3m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC00691.JPG	DSC00692.JPG	DSC00693.JPG	DSC00694.JPG	DSC00695.JPG	DSC00696.JPG	-	-	Here is a farmland long time ago. Commercial farmland.	
16	Cabo Delgado	Chiúre	2014/6/12	14:02	Kawai	CD016	-13°26'12"	39°24'47"	407	Miombo	Medium	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00703.JPG	DSC00704.JPG	DSC00705.JPG	DSC00706.JPG	DSC00707.JPG	DSC00708.JPG	DSC00709.JPG	DSC00710.JPG	Former settlement area. Miombo with Tree Crops. Regrowth Miombo.	
17	Cabo Delgado	Namuno	2014/6/12	15:42	Kawai	CD017	-13°25'00"	39°08'25"	497	Miombo (Deciduous)	Medium	~15m	Medium	Good	None	None	Flat	None	None	Brown	Sand	DSC00714.JPG	DSC00715.JPG	DSC00716.JPG	DSC00717.JPG	DSC00718.JPG	DSC00719.JPG	DSC00720.JPG	DSC00721.JPG	Regrowth Miombo. Shifting Cultivation 10 years ago. 10-15m height Miombo and 5-7m height regrowth Miombo.	*Julbernadia globiflora, Brachystegia spiciformis, Brachystegia bohemii, Diplorinchys condilocarpon, Afzelia quanzensis, Annona semegalensos*
18	Cabo Delgado	Montepuez	2014/6/12	16:45	Kawai	CD018	-13°18'16"	38°57'12"	550	Miombo/Deciduous	Old	~15m	Medium	Good	None	Vegetation	Medium	W	Long	Brown	Sand	DSC00728.JPG	DSC00729.JPG	DSC00730.JPG	DSC00731.JPG	DSC00732.JPG	DSC00733.JPG	DSC00734.JPG	DSC00735.JPG	Deciduous froests dominated by Miombo. Former Shifting Cultivation area.	*Brachystegia spiciformis, Brachystegia bohemii (Both are frequently spicies), Julbernadia globiflora, Milletia sthulmannii, Kigelia Africana (DSC00743-745.JPG), Stercylia quiqueloba*
19	Cabo Delgado	Montepuez	2014/6/13	14:03	Kawai	CD022	-12°49'31"	38°26'27"	380	Deciduous	Old 30yrs	~15m	Dense	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC00797.JPG	DSC00798.JPG	DSC00799.JPG	DSC00800.JPG	DSC00801.JPG	DSC00802.JPG	DSC00803.JPG	DSC00804.JPG	Original Deciduous Forest.	
20	Cabo Delgado	Montepuez	2014/6/13	13:12	Kawai	CD023	-12°46'33"	38°31'51"	491	Miombo	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00786.JPG	DSC00787.JPG	DSC00788.JPG	DSC00789.JPG	DSC00790.JPG	DSC00791.JPG	DSC00792.JPG	DSC00793.JPG	Pure Miombo Forest. Original Forest. All trees are kind of *Brachystegia* .	
21	Cabo Delgado	Montepuez	2014/6/13	12:12	Kawai	CD024	-12°37'21"	38°43'24"	357	Deciduous	Old	~15m	Medium	Good	None	None	Flat	None	None	Brown	Sand	DSC00771.JPG	DSC00772.JPG	DSC00773.JPG	DSC00774.JPG	DSC00775.JPG	DSC00776.JPG	DSC00777.JPG	DSC00778.JPG	Deciduous Forest with Scrub. Here is not Gallary Forest.	*Sterculia appendiculata, Cordiba Africana, Acacia (DSC00779-780.JPG)*
22	Cabo Delgado	Montepuez	2014/6/13	11:47	Kawai	CD025	-12°37'03"	38°45'00"	347	Miombo (Deciduous)	Old	~15m	Open	Good	None	Grass (H=2m)	Flat	None	None	Brown	Sand	DSC00757.JPG	DSC00758.JPG	DSC00759.JPG	DSC00760.JPG	DSC00761.JPG	DSC00762.JPG	DSC00763.JPG	DSC00764.JPG	Deciduous Miombo (Original Forest).	*Brachystegia spiciformis, Pterocarpus angolensis, Acacia nilotica, Diplorinchys condilocarpon (DSC00765-766.JPG), Dalbergia melanoxylon, Pseudolanostastilys maproumeifolia*
23	Cabo Delgado	Montepuez	2014/6/14	9:57	Kawai	CD026	-12°26'27"	39°01'01"	404	Miombo (Deciduous)	Old 20-30	~15m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00819.JPG	DSC00820.JPG	DSC00821.JPG	DSC00822.JPG	DSC00823.JPG	DSC00824.JPG	DSC00825.JPG	DSC00826.JPG	Deciduous Miombo Forest. But here is logged area long time ago.	*Brachystegia spiciformis, Pterocarpus angolensis, Diplorinchys condilocarpon, Afzelia quanzensis, Dalbergia melanoxylon*
24	Cabo Delgado	Montepuez	2014/6/14	10:56	Kawai	CD027	-12°18'26"	38°54'45"	374	Miombo (Deciduous)	Old	~15m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00838.JPG	DSC00839.JPG	DSC00840.JPG	DSC00841.JPG	DSC00842.JPG	DSC00843.JPG	DSC00844.JPG	DSC00845.JPG	Original Deciduous Miombo Forest.	*Brachystegia spiciformis, Brachystegia bohemii, Pterocarpus angolensis, Stercylia quiqueloba, Diplorinchys condilocarpon*
25	Cabo Delgado	Montepuez	2014/6/14	11:30	Kawai	CD028	-12°17'15"	38°52'00"	402	Miombo (Deciduous)	Medium 2	~10m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00851.JPG	DSC00852.JPG	DSC00853.JPG	DSC00854.JPG	DSC00855.JPG	DSC00856.JPG	DSC00857.JPG	DSC00858.JPG	Deciduous Miombo Open Forest. Bamboo (DSC00859.JPG).	*Brachystegia spiciformis, Pterocarpus angolensis, Terminalia sericea, Stercylia quiqueloba, Diplorinchys condilocarpon*
26	Cabo Delgado	Montepuez	2014/6/14	12:01	Kawai	CD029	-12°15'37"	38°49'27"	388	Deciduous	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00865.JPG	DSC00866.JPG	DSC00867.JPG	DSC00868.JPG	DSC00869.JPG	DSC00870.JPG	DSC00871.JPG	DSC00872.JPG	Deciduous Forest (Not Miombo).	*Terminalia sericea, Pteleopisis mirtyfolia, Pterocarpus angolensis, Milletia sthulmanii*
27	Cabo Delgado	Montepuez	2014/6/14	12:29	Kawai	CD030	-12°14'31"	38°47'37"	379	Grassland	None	0m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC00877.JPG	DSC00878.JPG	DSC00879.JPG	DSC00880.JPG	DSC00881.JPG	DSC00882.JPG	DSC00883.JPG	DSC00884.JPG	Permanent Grassland (H=1m).	
28	Cabo Delgado	Montepuez	2014/6/14	14:41	Kawai	CD031	-12°05'56"	39°12'58"	246	Deciduous	Old 20yrs	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC00889.JPG	DSC00890.JPG	DSC00891.JPG	DSC00892.JPG	DSC00893.JPG	DSC00894.JPG	DSC00895.JPG	DSC00896.JPG	Original Deciduous Open Forest.	*Pterocarpus angolensis, Milletia sthulmannii, Pteleopisis myrtifolia, Sclerocarya birrea, Dalbergia melanoxylon*
29	Cabo Delgado	Mueda	2014/6/16	12:20	Kawai	CD033	-11°23'55"	38°57'22"	282	Deciduous	Old	~10m	Dense	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC00948.JPG	DSC00949.JPG	DSC00950.JPG	DSC00951.JPG	DSC00952.JPG	DSC00953.JPG	DSC00954.JPG	DSC00955.JPG	Original Deciduous Dense Forest.	
30	Cabo Delgado	Mueda	2014/6/16	12:54	Kawai	CD034	-11°22'39"	38°56'04"	261	Thicket (Deciduous)	Old 20yrs	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC00961.JPG	DSC00962.JPG	DSC00963.JPG	DSC00964.JPG	DSC00965.JPG	DSC00966.JPG	DSC00967.JPG	DSC00968.JPG	Original Deciduous Dense Thicket.	
31	Cabo Delgado	Mueda	2014/6/16	11:30	Kawai	CD035	-11°21'56"	38°55'20"	250	Scrubland	Old	~5m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC00926.JPG	DSC00927.JPG	DSC00928.JPG	DSC00929.JPG	DSC00930.JPG	DSC00931.JPG	DSC00932.JPG	DSC00933.JPG		*Afzelia quanzensis, Dalbergia melanoxinos, Pterocarpus angolensis, Terminalia sericea*
32	Cabo Delgado	Mueda	2014/6/16	10:52	Kawai	CD036	-11°22'18"	38°55'06"	235	Deciduous	Old	~10m	Medium	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC00913.JPG	DSC00914.JPG	DSC00915.JPG	DSC00916.JPG	DSC00917.JPG	DSC00918.JPG	DSC00919.JPG	DSC00920.JPG		*Pleleopsis myrtifolia, Afzelia quanzensis, Bombax rodamapadon, Sthrychunus madascariensis*
33	Cabo Delgado	Mueda	2014/6/16	10:03	Kawai	CD037	-11°16'59"	39°00'50"	220	Deciduous	Medium 2	~10m	Open	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC00902.JPG	DSC00903.JPG	DSC00904.JPG	DSC00905.JPG	DSC00906.JPG	DSC00907.JPG	DSC00908.JPG	DSC00909.JPG	Regrowth Deciduous Forest. Former Agricultural area.	
34	Cabo Delgado	Mueda	2014/6/17	7:57	Kawai	CD038	-11°37'08"	39°37'50"	694	Thicket (Deciduous)	Young	~3m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC00974.JPG	DSC00975.JPG	DSC00976.JPG	DSC00977.JPG	DSC00978.JPG	DSC00979.JPG	DSC00980.JPG	DSC00981.JPG	Semi-deciduous Thicket. Shifting Cultivation area 2-3 years ago.	
35	Cabo Delgado	Mueda	2014/6/17	8:40	Kawai	CD039	-11°28'45"	39°42'57"	550	Thicket (Deciduous)	Young	~3m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC00988.JPG	DSC00989.JPG	DSC00990.JPG	DSC00991.JPG	DSC00992.JPG	DSC00993.JPG	DSC00994.JPG	DSC00995.JPG	Semi-deciduous Thicket. Shifting Cultivation area. May be still green in October.	
36	Cabo Delgado	Nangade	2014/6/17	9:11	Kawai	CD040	-11°24'38"	39°42'23"	533	Thicket (Deciduous)	Young	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC01013.JPG	DSC01014.JPG	DSC01015.JPG	DSC01016.JPG	DSC01017.JPG	DSC01018.JPG	DSC01019.JPG	DSC01020.JPG	Semi-deciduous Thicket. Shifting Cultivation area. Remnants of Cassava（DSC01012.JPG）.	
37	Cabo Delgado	Mocímboa da Pr	2014/6/17	13:09	Kawai	CD042	-11°14'17"	40°01'43"	146	Miombo (Deciduous)	Old	~15m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC01040.JPG	DSC01041.JPG	DSC01042.JPG	DSC01043.JPG	DSC01044.JPG	DSC01045.JPG	DSC01046.JPG	DSC01047.JPG	Deciduous Miombo Forest.	*Brachystegia spiciformis, Pterocarpus angolensis, Uapacas, Annona senegalensis*
38	Cabo Delgado	Nangade	2014/6/17	14:42	Kawai	CD043	-11°06'56"	39°57'28"	161	Evergreen	Old	~15m	Dense	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC01056.JPG	DSC01057.JPG	DSC01058.JPG	DSC01059.JPG	DSC01060.JPG	DSC01061.JPG	DSC01062.JPG	DSC01063.JPG	Semi-Evergreen Forest.	*Pteleopisis myrtifolia, Milletia sthulmanii*
39	Cabo Delgado	Mocímboa da Pr	2014/6/17	12:42	Kawai	CD044	-11°13'48"	40°03'29"	132	Evergreen	Old 30yrs	~10m	Dense	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC01026.JPG	DSC01027.JPG	DSC01028.JPG	DSC01029.JPG	DSC01030.JPG	DSC01031.JPG	DSC01032.JPG	DSC01033.JPG	Semi-Evergreen / Semi-Deciduous Forest. Should be classified as Semi-Evergreen. Original Forest.	
40	Cabo Delgado	Palma	2014/6/18	10:08	Kawai	CD045	-10°39'48"	40°31'44"	19	Coastal (Evergreen)	Old	~15m	Open	Good	None	Grass (H=1m)	Flat	None	None	Brown	Sand	DSC01106.JPG	DSC01107.JPG	DSC01108.JPG	DSC01109.JPG	DSC01110.JPG	DSC01111.JPG	DSC01112.JPG	DSC01113.JPG	Semi-Evergreen Coastal (Original) Forest. Coastal Trees (DSC01114-1118.JPG).	
41	Cabo Delgado	Palma	2014/6/18	9:55	Kawai	CD046	-10°39'55"	40°31'44"	18	Grassland	None	0m	Open	Good	None	None	Flat	None	None	Cray	Sand	DSC01094.JPG	DSC01095.JPG	DSC01096.JPG	DSC01097.JPG	DSC01098.JPG	DSC01099.JPG	DSC01100.JPG	DSC01101.JPG	Temporary Flooded Swamp. Flooded pictures (DSC01102-1104.JPG).	
42	Cabo Delgado	Palma	2014/6/18	9:39	Kawai	CD047	-10°40'05"	40°31'44"	20	Coastal (Evergreen)	Old	~10m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC01085.JPG	DSC01084.JPG	DSC01085.JPG	DSC01086.JPG	DSC01087.JPG	DSC01088.JPG	DSC01089.JPG	DSC01090.JPG	Semi-Evergreen Coastal (Original) Forest.	*Strychunus madascariensis, Maula*
43	Cabo Delgado	Palma	2014/6/18	11:38	Kawai	CD048	-10°41'20"	40°37'26"	12	Coastal (Deciduous)	Old	~5m	Dense	Good	None	None	Flat	None	None	Brown	Rock	DSC01142.JPG	DSC01143.JPG	DSC01144.JPG	DSC01145.JPG	DSC01146.JPG	DSC01147.JPG	DSC01148.JPG	DSC01149.JPG	Semi-Deciduous Coastal, but here is not a Forest (below 5m). Should be a scrubland.	
44	Cabo Delgado	Palma	2014/6/18	10:49	Kawai	CD049	-10°40'29"	40°34'37"	10	Field Crops	Old	0m	Open	Good	None	Grass	Flat	None	None	Cray	Sand	DSC01131.JPG	DSC01132.JPG	DSC01133.JPG	DSC01134.JPG	DSC01135.JPG	DSC01136.JPG	DSC01137.JPG	DSC01138.JPG	Permanent Agricultural area. Paddy Field.	
45	Cabo Delgado	Palma	2014/6/18	14:24	Kawai	CD050	-11°04'31"	40°19'10"	79	Coastal (Evergreen)	Young	~10m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC01172.JPG	DSC01173.JPG	DSC01174.JPG	DSC01175.JPG	DSC01176.JPG	DSC01177.JPG	DSC01178.JPG	DSC01179.JPG	Semi-Evergreen Coastal Forest. Shifting Cultivation.	
46	Cabo Delgado	Palma	2014/6/18	15:43	Kawai	CD051	-11°13'32"	40°22'50"	50	Evergreen	Medium	~10m	Dense	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC01201.JPG	DSC01202.JPG	DSC01203.JPG	DSC01204.JPG	DSC01205.JPG	DSC01206.JPG	DSC01207.JPG	DSC01208.JPG	Semi-Evergreen Forest. Former Agricurlrural area.	
47	Cabo Delgado	Macomia	2014/6/20	12:28	Kawai	CD054	-11°44'43"	40°24'51"	62	Deciduous	Old	~10m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC01395.JPG	DSC01396.JPG	DSC01397.JPG	DSC01398.JPG	DSC01399.JPG	DSC01400.JPG	DSC01401.JPG	DSC01402.JPG		
48	Cabo Delgado	Macomia	2014/6/20	11:30	Kawai	CD055	-11°45'17"	40°24'60"	64	Deciduous	Medium 2	~10m	Dense	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC01382.JPG	DSC01383.JPG	DSC01384.JPG	DSC01385.JPG	DSC01386.JPG	DSC01387.JPG	DSC01388.JPG	DSC01389.JPG	Regrowth Deciduous Forest. Shifting Cultivation area long time ago.	
49	Cabo Delgado	Macomia	2014/6/20	10:55	Kawai	CD056	-11°44'54"	40°26'58"	6	Mangrove	Old	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	-	-	-	-	-	DSC01369.JPG	DSC01367.JPG	DSC01368.JPG	Another kind of Mangrove (DSC01376-1377.JPG).	
50	Cabo Delgado	Macomia	2014/6/20	10:12	Kawai	CD058	-11°47'36"	40°26'48"	7	Grassland	None	0m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC01355.JPG	DSC01356.JPG	DSC01357.JPG	DSC01358.JPG	DSC01359.JPG	DSC01360.JPG	DSC01361.JPG	DSC01362.JPG	Swamp Grassland with Trees. Surrounded by Deciduous Coastal Forest.	
51	Cabo Delgado	Macomia	2014/6/20	9:04	Kawai	CD059	-11°54'56"	40°25'48"	66	Deciduous	Young 6-8	~5m	Open	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC01334.JPG	DSC01335.JPG	DSC01336.JPG	DSC01337.JPG	DSC01338.JPG	DSC01339.JPG	DSC01340.JPG	DSC01341.JPG	Deciduous / Tree Crops Mixed area. Field Crops were abondoned, and Deciduous forests were regrown later.	
52	Cabo Delgado	Macomia	2014/6/20	8:29	Kawai	CD060	-12°01'23"	40°27'39"	38	Tree Crops	Old	~15m	Open	Good	None	Field Crops	Flat	None	None	Brown	Sand	DSC01316.JPG	DSC01317.JPG	DSC01318.JPG	DSC01319.JPG	DSC01320.JPG	DSC01321.JPG	DSC01322.JPG	DSC01323.JPG	Tree Crops (Caju and Mango). Permanent area.	*Caju, Mango, Cassava (DSC01324.JPG), Maize, Sorgum (DSC01325.JPG) and Beans (DSC01328.JPG).*
53	Cabo Delgado	Macomia	2014/6/19	13:48	Kawai	CD062	-12°15'34"	40°10'41"	212	Deciduous	Old	~15m	Open	Good	None	Dried grass (H=2m)	Flat	None	None	Brown	Sand	DSC01269.JPG	DSC01270.JPG	DSC01271.JPG	DSC01272.JPG	DSC01273.JPG	DSC01274.JPG	DSC01275.JPG	DSC01276.JPG	Shifting Cultivation with Forest. Former Agricultural area. Some Tree Crops (Caju) can be seen (DSC01277.JPG).	
54	Cabo Delgado	Macomia	2014/6/19	12:58	Kawai	CD063	-11°51'01"	40°06'24"	43	Tree Crops	Old	~30m	Open	Good	None	Agriculture	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC01262.JPG	DSC01263.JPG	Commercial Agriculture area.	*Palma real (Palm tree), Maize (DSC01264).JPG.*
55	Cabo Delgado	Macomia	2014/6/20	7:50	Kawai	CD064	-12°03'55"	40°30'02"	2	Mangrove	Medium	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC01296.JPG	DSC01297.JPG	DSC01298.JPG	DSC01299.JPG	DSC01300.JPG	DSC01301.JPG	DSC01302.JPG	DSC01303.JPG		*Avicenia marina, Rizophora mucronata*

（4） Implementation of Ground Truth Surveys for Preparation of National Forest Cover Maps

The following shows results of the national scale GT surveys.

1） Manica Province

Survey points are shown in Figure 8, and results of this GT survey are summarized in Table 7. In Manica Province, the total 42 points were surveyed, and they included: (semi-)deciduous forests (13), miombo (8), (semi-)evergreen forests (including plantation (5)) (9), thickets (1), grasslands (5), and field crops (6). In this province, evergreen forests and plantations were found. At the same time, miombo were found in the southern part of the province. In the northern part of the province, on the other hand, mopane forests mixed with semi-deciduous forests were found.

2） Tete Province

Survey points are shown in Figure 9, and results of this GT survey are summarized in Table 8. In Tete Province, the total 56 points were surveyed, and they included: evergreen forests (2), (semi-)deciduous forests (18), miombo (14), mopane (5), thickets (1), grasslands (7), field crops (7), and built-up areas (2). In Tete Province, mopane forests were found in the southern part of the province, while miombo were found in the northern part of the province. In northeastern part of the province, shifting cultivations were also widely found.

3） Niassa Province

Survey points are shown in Figure 10, and results of this GT survey are summarized in Table 9. In Niassa Province, the total 62 points were surveyed, and they included: evergreen forests (including plantation (5)) (8), (semi-)deciduous forests (17), miombo (22), thickets (1), grasslands (9), shrublands (3), and field crops (2). Most part of this province is located at high altitudes (around approximately 1,000m) and in cool environment. In this region, plantations (e.g. pines) were often found. (Semi-) deciduous forests and miombo were also found in this province.

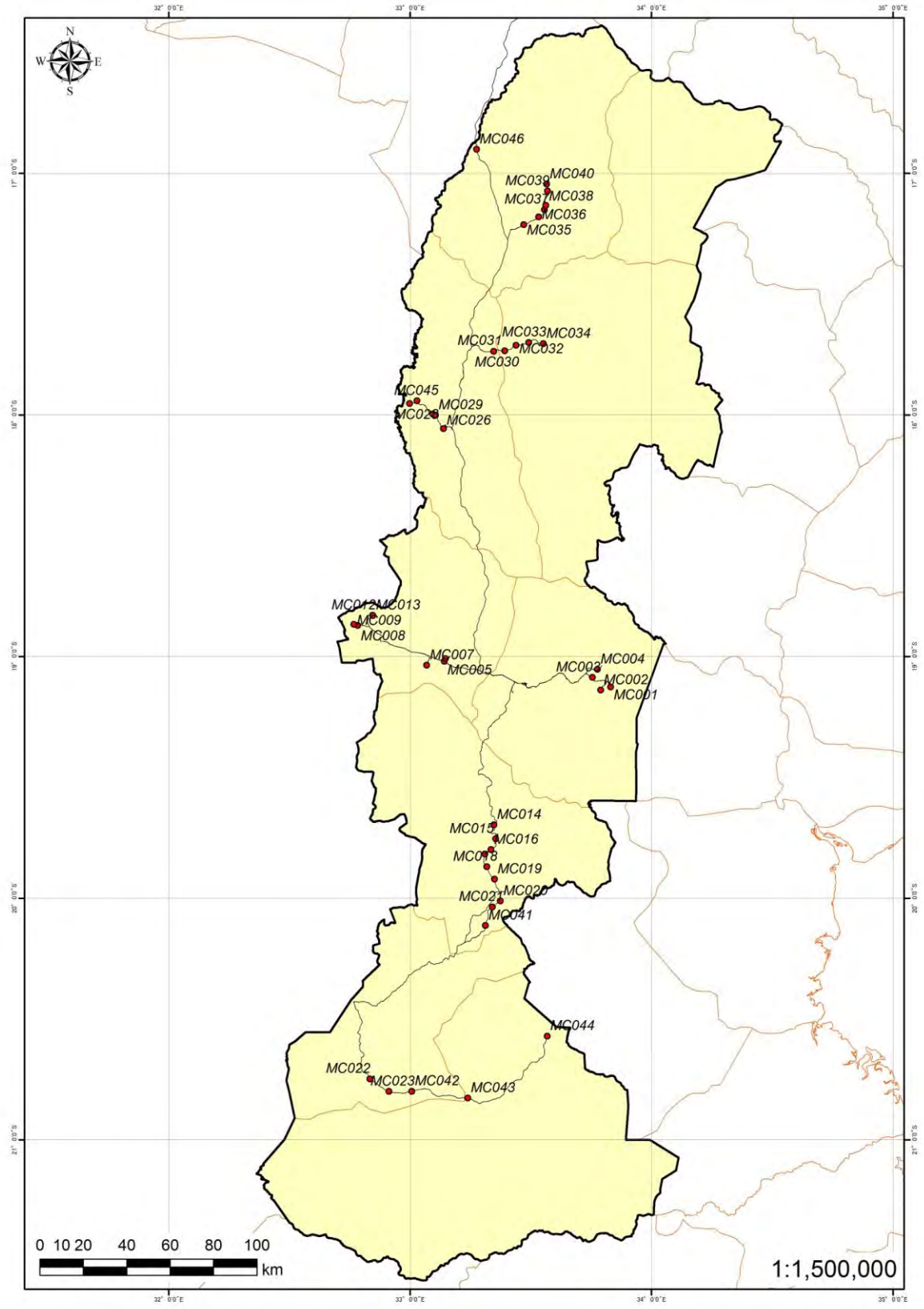

Figure 8 GT Survey Points in Manica Province

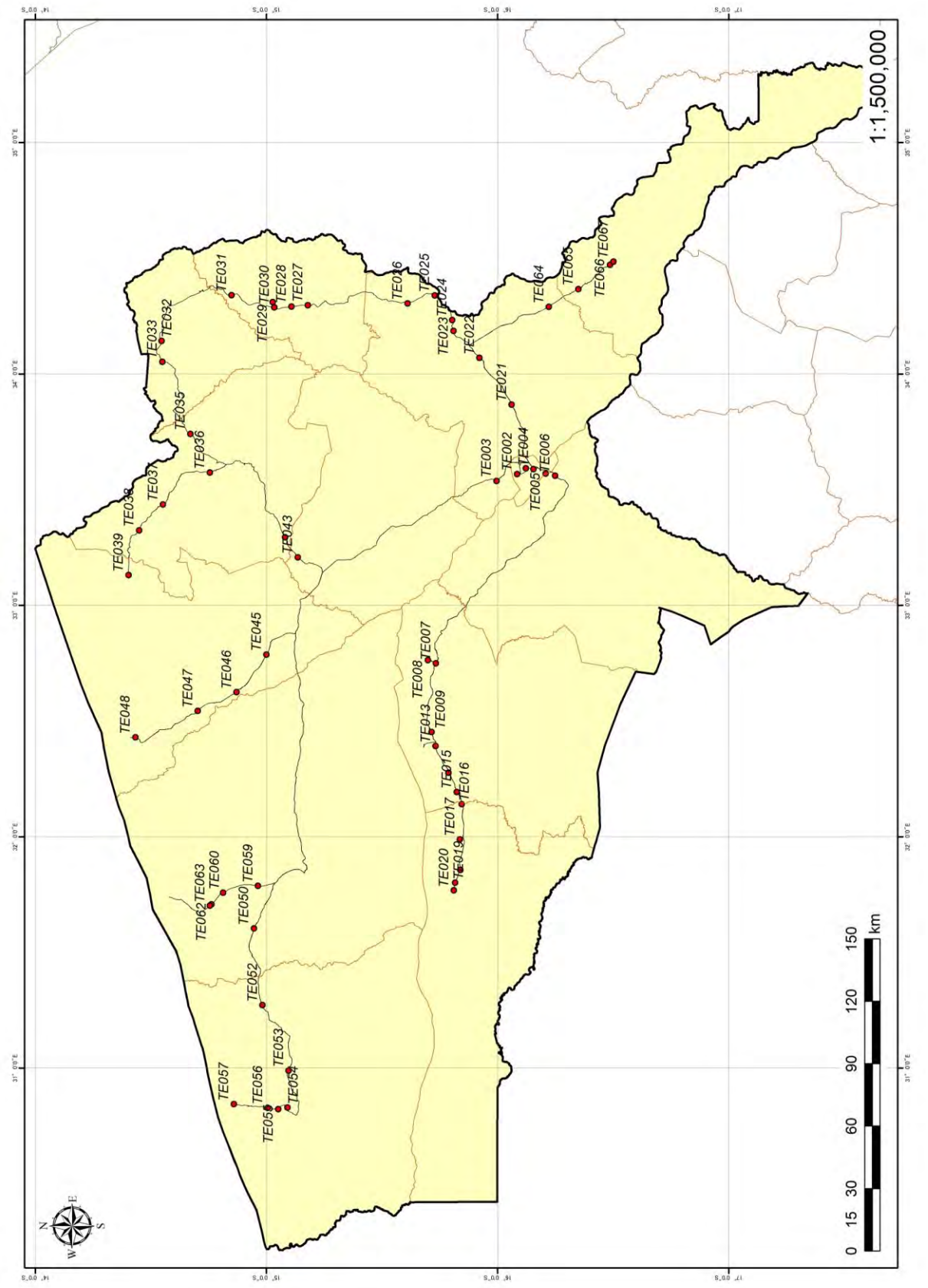

Figure 9 GT Survey Points in Tete Province

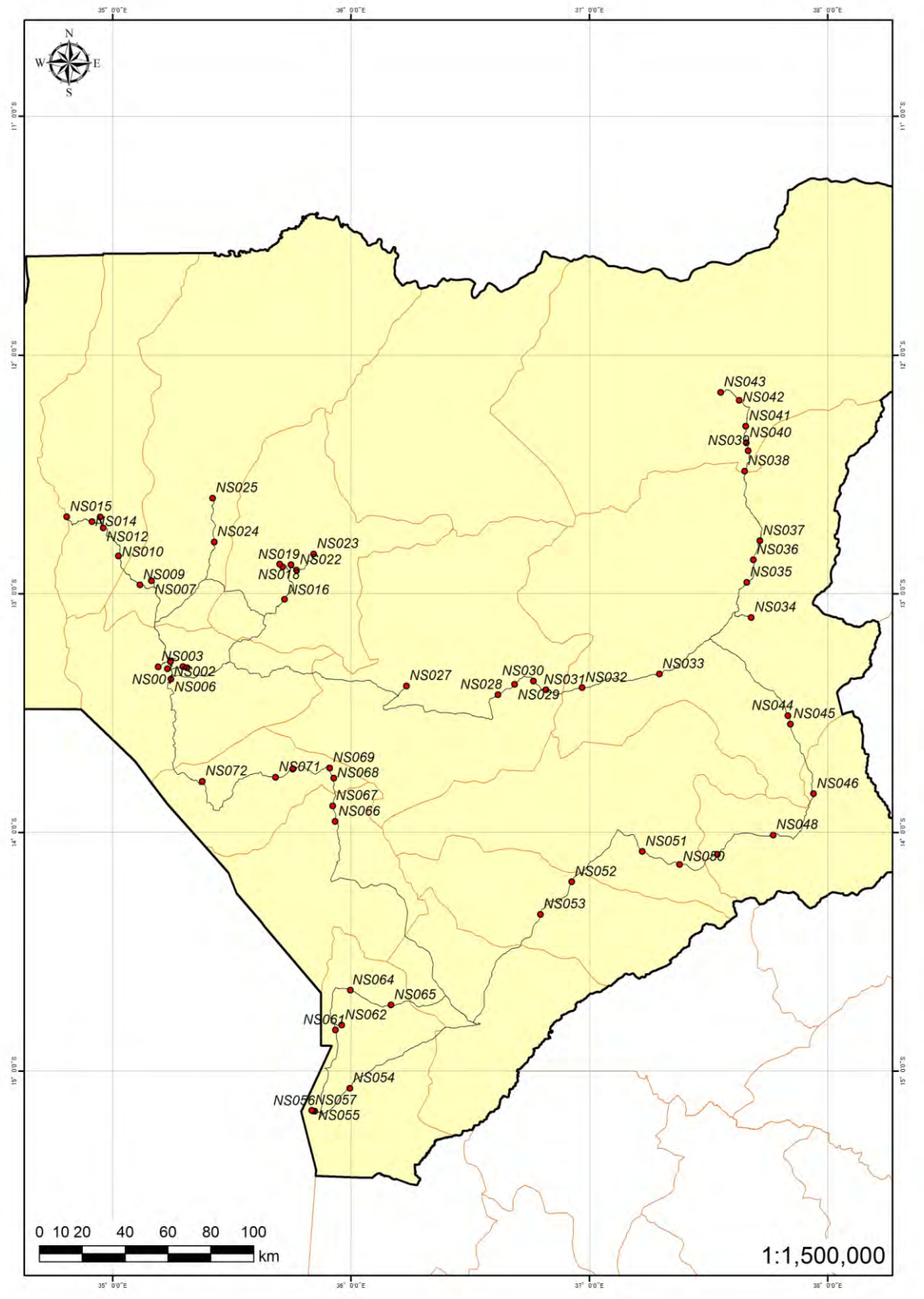

Figure 10 GT Survey Points in Niassa Province

Table 7 Results of the GT Survey in Manica Province

UID	Province	District	Date	Time	Surveyor	Point No.	Latitude (N)	Longitude (E)	Elevation (m)	Forest Type in Field						Understory	Slope			Soil		Photo No								Comments 1	Comments 2 (Spices)
										General	Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	North	East	South	West	Above	Ground	Distance View	Near View		
1	Manica	Gondola	2014/8/20	15:20	Kawai	MC001	19°07'33"	33°49'50"	411	Grassland (CFX)	-	~3m	Open	-	None	Shrub	Gentle	SE	Medium	Brown	Sand	DSC01410.JPG	DSC01411.JPG	DSC01412.JPG	DSC01413.JPG	DSC01414.JPG	DSC01415.JPG	DSC01416.JPG	DSC01417.JPG	It was forest long time ago. Shifting Cultivation (Shrub and Thicket). Chacoal production for Beira and Chimoio.	
2	Manica	Gondola	2014/8/20	15:52	Kawai	MC002	19°08'20"	33°47'23"	314	Field Crops (CFX)	-	~3m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC01419.JPG	DSC01420.JPG	DSC01421.JPG	DSC01422.JPG	DSC01423.JPG	DSC01424.JPG	DSC01425.JPG	DSC01426.JPG	Forest areas were found on both sides of roads. Only this area was agriculture land. Panoramic picture (DSC01427.JPG).	
3	Manica	Gondola	2014/8/20	16:28	Kawai	MC003	19°05'11"	33°45'20"	469	Grassland (CFX)	Medium	~3m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC01431.JPG	DSC01432.JPG	DSC01433.JPG	DSC01434.JPG	DSC01435.JPG	DSC01436.JPG	DSC01437.JPG	DSC01438.JPG	Here was Field Crops long time ago. Orange tree (DSC01430.JPG).	
4	Manica	Gondola	2014/8/20	16:55	Kawai	MC004	19°03'11"	33°46'35"	462	Deciduous	Old (20-5(	~15m	Medium	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC01446.JPG	DSC01447.JPG	DSC01448.JPG	DSC01449.JPG	DSC01450.JPG	DSC01451.JPG	DSC01452.JPG	DSC01453.JPG	While no forest was found in neighboring areas due to logging, forests exist only in this specific part of areas as because of reforestation. This area is known as "cemetereo."	*Brachystegia spiciformis, Uapaca, Kirkiana*
5	Manica	Manica	2014/8/21	9:46	Kawai	MC005	19°01'12"	33°08'29"	685	Semi-Evergreen (Plantation)	Medium (	~20m	Medium	Good	None	Shrub	Flat	None	None	Brown	Sand	DSC01467.JPG	DSC01468.JPG	DSC01469.JPG	DSC01470.JPG	DSC01471.JPG	DSC01472.JPG	DSC01473.JPG	DSC01474.JPG	Plantation (Semi-Evergreen). Shrubs are deciduous.	*Eucalibto Saligma*
6	Manica	Manica	2014/8/21	10:14	Kawai	MC006	19°00'33"	33°08'48"	696	Semi-Evergreen (Plantation)	Young (~1(	~15m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC01482.JPG	DSC01483.JPG	DSC01484.JPG	DSC01485.JPG	DSC01486.JPG	DSC01487.JPG	DSC01488.JPG	DSC01489.JPG	Fire protection area.	*Eucalibto Saligma*
7	Manica	Manica	2014/8/21	10:48	Kawai	MC007	19°02'10"	33°04'06"	657	Deciduous	Medium	~10m	Medium	Good	None	Dried Grass	Flat	None	None	Yellow	Sand	DSC01491.JPG	DSC01492.JPG	DSC01493.JPG	DSC01494.JPG	DSC01495.JPG	DSC01496.JPG	DSC01497.JPG	DSC01498.JPG	Poor soil area.	
8	Manica	Manica	2014/8/21	11:57	Kawai	MC008	18°52'18"	32°46'58"	816	Grassland (Shrubland)	Young	~3m	Dense	Good	None	None	Gentle	N	Medium	Cray	Sand	DSC01506.JPG	DSC01507.JPG	DSC01508.JPG	DSC01509.JPG	DSC01510.JPG	DSC01511.JPG	DSC01512.JPG	DSC01513.JPG	Shrubland including Acacia.	
9	Manica	Manica	2014/8/21	12:18	Kawai	MC009	18°52'02"	32°45'60"	861	Evergreen (Plantation)	Old (20- y	~20m	Medium	Good	None	Vegetation	Medium	E	Medium	Brown	Sand	DSC01521.JPG	DSC01522.JPG	DSC01523.JPG	DSC01524.JPG	DSC01525.JPG	DSC01526.JPG	DSC01527.JPG	DSC01528.JPG	Plantation.	*Pine*
10	Manica	Manica	2014/8/21	13:21	Kawai	MC012	18°49'45"	32°50'43"	1081	Semi-Evergreen (Plantation)	-	0m	Open	-	Clear-cut	None	Medium	NW	Long	Cray	Sand	DSC01537.JPG	DSC01538.JPG	DSC01539.JPG	DSC01540.JPG	DSC01541.JPG	DSC01542.JPG	DSC01543.JPG	DSC01544.JPG	Plantation. However, already cut.	*Eucalibto Saligma*
11	Manica	Manica	2014/8/21	13:32	Kawai	MC013	18°49'48"	32°50'45"	1110	Field Crops	-	0m	Open	-	None	Dried Grass	Gentle	S	Medium	Brown	Sand	DSC01548.JPG	DSC01549.JPG	DSC01550.JPG	DSC01551.JPG	DSC01552.JPG	DSC01553.JPG	DSC01554.JPG	DSC01555.JPG		*Maize, Banana, Mango, Orange*
12	Manica	Sussundenga	2014/8/22	10:11	Kawai	MC014	19°41'49"	33°20'53"	604	Semi-Evergreen	Old	~15m	Dense	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC01567.JPG	DSC01568.JPG	DSC01569.JPG	DSC01570.JPG	DSC01571.JPG	DSC01572.JPG	DSC01573.JPG	DSC01574.JPG	Soil contains a large amount of moisture.	*Miissanda, Khaya nyasica*
13	Manica	Sussundenga	2014/8/22	10:46	Kawai	MC015	19°45'19"	33°21'16"	501	Semi-Evergreen	Old	~15m	Dense	Good	None	Vegetation	Gentle	E	Medium	Brown	Sand	DSC01586.JPG	DSC01587.JPG	DSC01588.JPG	DSC01589.JPG	DSC01590.JPG	DSC01591.JPG	DSC01592.JPG	DSC01593.JPG		*Albizia adiantiforia, Mellettia stuhlmanni*
14	Manica	Sussundenga	2014/8/22	11:11	Kawai	MC016	19°47'59"	33°20'05"	239	Miombo	Old	~15m	Open	Good	None	Vegetation	Flat	None	None	Brown	Sand	DSC01600.JPG	DSC01601.JPG	DSC01602.JPG	DSC01603.JPG	DSC01604.JPG	DSC01605.JPG	DSC01606.JPG	DSC01607.JPG	Miombo (Deciduous) Forest. Partly Field Crops long time ago.	*Albizia adiantiforia, Diplorinchys, Brachystegia spiciformis, Pterocarpus angolensis*
15	Manica	Sussundenga	2014/8/22	11:35	Kawai	MC017	19°49'01"	33°18'34"	230	Field Crops	-	0m	Open	-	Burned	None	Medium	SE	Medium	Brown	Sand	DSC01615.JPG	DSC01616.JPG	DSC01617.JPG	DSC01618.JPG	DSC01619.JPG	DSC01620.JPG	DSC01621.JPG	DSC01622.JPG		*Maize, Cassava, Peanut*
16	Manica	Sussundenga	2014/8/22	11:58	Kawai	MC018	19°55'12"	33°19'04"	174	Field Crops	-	0m	Open	-	None	None	Flat	None	None	-	-	-	-	-	-	-	-	DSC01624.JPG	DSC01625.JPG	Huge Field Crop area.	*Maize, Banana, Others*
17	Manica	Sussundenga	2014/8/22	12:20	Kawai	MC019	19°55'18"	33°20'60"	169	Miombo	Old (20- y	~15m	Open	Good	None	Grass	Flat	None	None	Brown	Sand	DSC01639.JPG	DSC01640.JPG	DSC01641.JPG	DSC01642.JPG	DSC01643.JPG	DSC01644.JPG	DSC01645.JPG	DSC01646.JPG		*Brachystegia bohemii, Albizia adiantiforia, Pterocarpus angolensis, Combretum heroereuse, Anona senegalensis*
18	Manica	Sussundenga	2014/8/22	14:10	Kawai	MC020	20°00'44"	33°22'27"	160	Deciduous	Medium	~10m	Open	Normal	Burned	Dried Grass	Flat	None	None	Brown	Sand	DSC01670.JPG	DSC01671.JPG	DSC01672.JPG	DSC01673.JPG	DSC01674.JPG	DSC01675.JPG	DSC01677.JPG	DSC01678.JPG		*Pterocarpus angolensis, Pteleopisis mirtyfolia, Diplorinchys, Combretum heroereuse*
19	Manica	Sussundenga	2014/8/22	13:51	Kawai	MC021	20°02'11"	33°20'25"	157	Field Crops	-	0m	Open	-	None	None	Flat	None	None	Cray	Sand	DSC01657.JPG	DSC01658.JPG	DSC01659.JPG	DSC01660.JPG	DSC01661.JPG	DSC01662.JPG	DSC01663.JPG	DSC01664.JPG		*Maize*
20	Manica	Mossurize	2014/8/23	8:32	Kawai	MC022	20°44'54"	32°50'00"	346	Deciduous	Old (20- y	~15m	Medium	Good	None	None	Flat	None	None	Brown	Sand	DSC01697.JPG	DSC01698.JPG	DSC01699.JPG	DSC01700.JPG	DSC01701.JPG	DSC01702.JPG	DSC01703.JPG	DSC01704.JPG	Miombo was partially found. Overall, this area is classified as Deciduous.	
21	Manica	Mossurize	2014/8/23	8:56	Kawai	MC023	20°48'01"	32°54'43"	371	Field Crops	-	0m	Open	-	None	None	Flat	None	None	Brown	Sand	DSC01713.JPG	DSC01714.JPG	DSC01715.JPG	DSC01716.JPG	DSC01717.JPG	DSC01718.JPG	DSC01719.JPG	DSC01720.JPG	The survey point is located within FC (Cotton). Neighboring areas are classified as Deciduous.	
22	Manica	Barue	2014/8/25	10:11	Kawai	MC026	18°03'25"	33°08'20"	1107	Miombo	Old	~10m	Dense	Good	None	Dried Grass	Medium	E	Long	Brown	Sand	DSC01788.JPG	DSC01789.JPG	DSC01790.JPG	DSC01791.JPG	DSC01792.JPG	DSC01793.JPG	DSC01794.JPG	DSC01795.JPG	Miombo forest dominated by Uapaca and Brachystegia.	
23	Manica	Barue	2014/8/25	11:07	Kawai	MC027	17°59'48"	33°05'40"	1470	Grassland	-	0m	Open	Good	None	None	Medium	W	Medium	Brown	Sand	DSC01820.JPG	DSC01821.JPG	DSC01822.JPG	DSC01823.JPG	DSC01824.JPG	DSC01825.JPG	DSC01826.JPG	DSC01827.JPG		
24	Manica	Barue	2014/8/25	11:52	Kawai	MC028	17°57'13"	32°59'52"	1429	Evergreen	Old	~10m	Dense	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC01837.JPG	DSC01838.JPG	DSC01839.JPG	DSC01840.JPG	DSC01841.JPG	DSC01842.JPG	DSC01843.JPG	DSC01844.JPG	Uapaca dominant forest. Evergreen.	
25	Manica	Barue	2014/8/25	13:07	Kawai	MC029	18°00'04"	33°06'21"	1497	Evergreen	Old	~15m	Dense	Good	None	Small vegetation	Gentle	W	Medium	Brown	Sand	DSC01876.JPG	DSC01877.JPG	DSC01878.JPG	DSC01879.JPG	DSC01880.JPG	DSC01881.JPG	DSC01882.JPG	DSC01883.JPG	Soil contains a large amount of moisture.	*Eicus, Khaya nyassica*
26	Manica	Macossa	2014/8/25	14:49	Kawai	MC030	17°44'14"	33°20'46"	664	Miombo	Old	~15m	Open	Good	None	Dried Grass (Hi=1.5m)	Flat	None	None	Brown	Sand	DSC01900.JPG	DSC01901.JPG	DSC01902.JPG	DSC01903.JPG	DSC01904.JPG	DSC01905.JPG	DSC01906.JPG	DSC01907.JPG		*Brachystegia spiciformis, Brachystegia bohemi, Burkea africana, Pseodolastilys mapronoifolia*
27	Manica	Macossa	2014/8/25	15:11	Kawai	MC031	17°44'05"	33°23'31"	771	Miombo	Old (30- y	~15m	Open	Good	None	Dried Grass (Hi=1.5m)	Medium	S	Long	Brown	Sand	DSC01917.JPG	DSC01918.JPG	DSC01919.JPG	DSC01920.JPG	DSC01921.JPG	DSC01922.JPG	DSC01923.JPG	DSC01924.JPG		*Brachystegia spiciformis, Burkea africana (DSC01925.JPG), Diphrolynchus condilocarpun (DSC01926.JPG)*
28	Manica	Macossa	2014/8/25	15:34	Kawai	MC032	17°42'41"	33°26'19"	746	Deciduous	Old	~15m	Open	Good	None	Dried Grass (Hi=2.0m)	Flat	None	None	Brown	Sand	DSC01933.JPG	DSC01934.JPG	DSC01935.JPG	DSC01936.JPG	DSC01937.JPG	DSC01938.JPG	DSC01939.JPG	DSC01940.JPG		*Pseodolastilys mapronoifolia, Kegelia africana (DSC01942-44.JPG), Combretum*
29	Manica	Macossa	2014/8/25	15:51	Kawai	MC033	17°42'01"	33°29'29"	698	Miombo	Old	~10m	Open	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC01948.JPG	DSC01949.JPG	DSC01950.JPG	DSC01951.JPG	DSC01952.JPG	DSC01953.JPG	DSC01954.JPG	DSC01955.JPG		*Brachystegia spiciformis, Brachystegia bohemi, Pterocarpus angolensis, Burkea africana*
30	Manica	Macossa	2014/8/25	16:12	Kawai	MC034	17°42'19"	33°33'08"	672	Miombo	Old	~15m	Open	Good	Burning	Dried Grass	Flat	None	None	Brown	Sand	DSC01963.JPG	DSC01964.JPG	DSC01965.JPG	DSC01966.JPG	DSC01967.JPG	DSC01968.JPG	DSC01969.JPG	DSC01970.JPG	Undergrowth is currently being burnt in areas a long way in from the surey point.	*Brachystegia spiciformis, Burkea africana, Pterocarpus angolensis, Juibernardea grobiflora*
31	Manica	Guro	2014/8/26	10:56	Kawai	MC035	17°12'45"	33°28'16"	596	Deciduous	Old	~10m	Open	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC01980.JPG	DSC01981.JPG	DSC01982.JPG	DSC01983.JPG	DSC01984.JPG	DSC01985.JPG	DSC01986.JPG	DSC01987.JPG		*Combretum, Acacia, Terminalia, Sclerocarya birrea*
32	Manica	Guro	2014/8/26	11:20	Kawai	MC036	17°10'52"	33°31'56"	558	Deciduous	Old	~10m	Open	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC02001.JPG	DSC02002.JPG	DSC02003.JPG	DSC02004.JPG	DSC02005.JPG	DSC02006.JPG	DSC02007.JPG	DSC02008.JPG	Poor soil area.	*Sclerocarya birrea, Combretum*
33	Manica	Guro	2014/8/26	11:43	Kawai	MC037	17°09'03"	33°33'24"	537	Deciduous	Old	~10m	Open	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC02020.JPG	DSC02021.JPG	DSC02022.JPG	DSC02023.JPG	DSC02024.JPG	DSC02025.JPG	DSC02026.JPG	DSC02027.JPG	Poor soil area.	*Combretum*
34	Manica	Guro	2014/8/26	12:03	Kawai	MC038	17°07'59"	33°33'46"	531	Deciduous	Old	~15m	Dense	Good	None	Small vegetation (Dried	Flat	None	None	Brown	Sand	DSC02036.JPG	DSC02037.JPG	DSC02038.JPG	DSC02039.JPG	DSC02040.JPG	DSC02041.JPG	DSC02042.JPG	DSC02043.JPG	Areas of 100 meter forward were FC (w/Forest). Areas from there on were DF.	*Combretum, Acacia (DSC02053.JPG)*
35	Manica	Guro	2014/8/26	12:32	Kawai	MC039	17°04'24"	33°34'11"	532	Grassland (Shrubland)	Old	~3m	Dense	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC02061.JPG	DSC02062.JPG	DSC02063.JPG	DSC02064.JPG	DSC02065.JPG	DSC02066.JPG	DSC02067.JPG	DSC02068.JPG	Mixed area (Shrub 70% and Thicket 10%). Deciduous shrubland.	
36	Manica	Guro	2014/8/26	12:51	Kawai	MC040	17°02'42"	33°33'59"	535	Deciduous	Old	~15m	Open	Good	Burned	Dried Grass	Flat	None	None	Brown	Sand	DSC02076.JPG	DSC02077.JPG	DSC02078.JPG	DSC02079.JPG	DSC02080.JPG	DSC02081.JPG	DSC02082.JPG	DSC02083.JPG		*Combretum, Acacia*
37	Manica	Sussundenga	2014/8/22	14:37	Kawai	MC041	20°06'50"	33°18'45"	176	Miombo	Old (20- y	~15m	Medium	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC01685.JPG	DSC01686.JPG	DSC01687.JPG	DSC01688.JPG	DSC01689.JPG	DSC01690.JPG	DSC01691.JPG	DSC01692.JPG		*Brachystegia bohemii, Brachystegia spicifformis, Pterocarpus angolensis*
38	Manica	Mossurize	2014/8/23	9:20	Kawai	MC042	20°47'60"	33°00'27"	328	Thicket	Old	~5m	Open	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC01729.JPG	DSC01730.JPG	DSC01731.JPG	DSC01732.JPG	DSC01733.JPG	DSC01734.JPG	DSC01735.JPG	DSC01736.JPG	Original Thicket. Poor soil area.	
39	Manica	Machaze	2014/8/23	9:49	Kawai	MC043	20°49'39"	33°14'22"	369	Deciduous	Old	~10m	Open	Good	None	Dried Grass	Flat	None	None	Brown	Sand	DSC01745.JPG	DSC01746.JPG	DSC01747.JPG	DSC01748.JPG	DSC01749.JPG	DSC01750.JPG	DSC01751.JPG	DSC01752.JPG		
40	Manica	Machaze	2014/8/23	10:55	Kawai	MC044	20°34'16"	33°34'04"	280	Deciduous	Old	~10m	Dense	Good	None	Shrub	Flat	None	None	Brown	Sand	DSC01764.JPG	DSC01765.JPG	DSC01766.JPG	DSC01767.JPG	DSC01768.JPG	DSC01769.JPG	DSC01770.JPG	DSC01771.JPG		
41	Manica	Barue	2014/8/25	12:27	Kawai	MC045	17°56'32"	33°01'44"	1615	Semi-Evergreen (Plantation)	Old	~15m	Open	Good	None	None	Gentle	S	Medium	Brown	Sand	DSC01858.JPG	DSC01859.JPG	DSC01860.JPG	DSC01861.JPG	DSC01862.JPG	DSC01863.JPG	DSC01864.JPG	DSC01865.JPG	Plantation.	*Eucalibto Saligma*
42	Manica	Guro	2014/8/26	14:30	Kawai	MC046	16°54'04"	33°16'34"	350	Deciduous (and Mopane)	Old	~15m	Dense	Good	Selective	Dried Grass	Flat	None	None	Brown	Sand	DSC02106.JPG	DSC02107.JPG	DSC02108.JPG	DSC02109.JPG	DSC02110.JPG	DSC02111.JPG	DSC02112.JPG	DSC02113.JPG	Deciduous and Mopane forests. Trees with leaves in green were Mopane, and trees without leaves after leaves fell were DF.	

Table 8 Results of the GT Survey in Tete Province

UID	Province	District	Date	Time	Surveyor	Point No.	Latitude (N)	Longitude (E)	Elevation (m)	Forest Type in Field					Understory	Slope			Soil		Photo No								Comments 1	Comments 2 (Spices)
										General	Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	North	East	South	West	Above	Ground	Distance View	Near View		
1	Tete	Tete	2014/8/27	11:25	Kawai	TE001	-16°07'20"	33°35'36"	155	Buildup Area	-	-	Open	-	None	Small vegetation	Flat	None	None	Brown	Sand	DSC02122.JPG	DSC02123.JPG	DSC02124.JPG	DSC02125.JPG	DSC02126.JPG	DSC02127.JPG	DSC02128.JPG	DSC02129.JPG		
2	Tete	Tete	2014/8/27	12:00	Kawai	TE002	-16°05'07"	33°34'05"	174	Grassland (Shrubland)	Old	~5m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC02137.JPG	DSC02138.JPG	DSC02139.JPG	DSC02140.JPG	DSC02141.JPG	DSC02142.JPG	DSC02143.JPG	DSC02144.JPG	Shrubland including partly Thicket.	
3	Tete	Moatize	2014/8/27	12:51	Kawai	TE003	-15°59'43"	33°32'21"	314	Deciduous	Old	~10m	Medium	Good	None	None	Gentle	N	Short	Brown	Medium	DSC02156.JPG	DSC02157.JPG	DSC02158.JPG	DSC02159.JPG	DSC02160.JPG	DSC02161.JPG	DSC02162.JPG	DSC02163.JPG	Deciduous forest. Some Mopane trees can be seen.	
4	Tete	Tete	2014/8/27	13:36	Kawai	TE004	-16°09'22"	33°35'25"	135	Grassland	-	~3m	Open	-	None	None	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC02171.JPG	DSC02172.JPG	Grassland and Agricultural area.	
5	Tete	Changara	2014/8/27	14:09	Kawai	TE005	-16°12'28"	33°34'12"	345	Semi-Deciduous	Old	~10m	Open	Good	None	None	Gentle	W	Medium	Brown	Sand	DSC02183.JPG	DSC02184.JPG	DSC02185.JPG	DSC02186.JPG	DSC02187.JPG	DSC02188.JPG	DSC02189.JPG	DSC02190.JPG	Another kind of Acacia (DSC02191-93.JPG). The survey point is located in DF. Overall, this area is open forest.	
6	Tete	Changara	2014/8/27	14:43	Kawai	TE006	-16°14'56"	33°33'40"	296	Grassland (Shrubland)	Medium	~5m	Open	Normal	None	Dried vegetation	Gentle	W	Short	Brown	Small	DSC02216.JPG	DSC02217.JPG	DSC02218.JPG	DSC02219.JPG	DSC02220.JPG	DSC02221.JPG	DSC02222.JPG	DSC02223.JPG		
7	Tete	Cahora Bassa	2014/8/28	16:27	Kawai	TE007	-15°43'60"	32°45'02"	350	Deciduous	Old	~15m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC02427.JPG	DSC02428.JPG	DSC02429.JPG	DSC02430.JPG	DSC02431.JPG	DSC02432.JPG	DSC02433.JPG	DSC02434.JPG		*Acacia (Mostly), Macaniqueira*
8	Tete	Cahora Bassa	2014/8/28	16:06	Kawai	TE008	-15°41'53"	32°45'49"	576	Deciduous	Old	~10m	Dense	Good	None	Vegetation	Steep	W	Long	Brown	Rock	-	-	-	-	-	-	DSC02408.JPG	DSC02409.JPG		*Brachystegia spiciformis (DSC02414-15.JPG)*
9	Tete	Cahora Bassa	2014/8/28	10:06	Kawai	TE009	-15°42'52"	32°27'13"	397	Mopane	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Small	DSC02233.JPG	DSC02234.JPG	DSC02235.JPG	DSC02236.JPG	DSC02237.JPG	DSC02238.JPG	DSC02239.JPG	DSC02240.JPG	Poor soil and conservation area.	
10	Tete	Cahora Bassa	2014/8/28	11:14	Kawai	TE013	-15°43'55"	32°23'34"	369	Field Crops	-	0m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02257.JPG	DSC02258.JPG	DSC02259.JPG	DSC02260.JPG	DSC02261.JPG	DSC02262.JPG	DSC02263.JPG	DSC02264.JPG	Regrowth forests cannot be found. Planting is conducted every year.	*Maize*
11	Tete	Cahora Bassa	2014/8/28	11:40	Kawai	TE014	-15°47'15"	32°16'37"	394	Mopane	Old	~15m	Medium	Good	None	Dried grass	Gentle	S	Short	Brown	Medium	DSC02274.JPG	DSC02275.JPG	DSC02276.JPG	DSC02277.JPG	DSC02278.JPG	DSC02279.JPG	DSC02280.JPG	DSC02281.JPG		
12	Tete	Cahora Bassa	2014/8/28	12:00	Kawai	TE015	-15°49'25"	32°11'38"	369	Mopane	Old (20-yr	~15m	Dense	Good	None	Dried vegetation	Gentle	S	Medium	Brown	Medium	DSC02291.JPG	DSC02292.JPG	DSC02293.JPG	DSC02294.JPG	DSC02295.JPG	DSC02296.JPG	DSC02297.JPG	DSC02298.JPG		
13	Tete	Magoe	2014/8/28	12:25	Kawai	TE016	-15°50'43"	32°08'28"	349	Settlement	-	0m	Open	-	-	None	Flat	None	None	Brown	Sand	DSC02312.JPG	DSC02313.JPG	DSC02314.JPG	DSC02315.JPG	DSC02316.JPG	DSC02317.JPG	DSC02318.JPG	DSC02319.JPG		
14	Tete	Magoe	2014/8/28	13:22	Kawai	TE017	-15°50'13"	31°59'22"	367	Mopane	Old	~15m	Dense	Good	None	Dried grass	Gentle	W	Medium	Brown	Sand	DSC02324.JPG	DSC02325.JPG	DSC02326.JPG	DSC02327.JPG	DSC02328.JPG	DSC02329.JPG	DSC02330.JPG	DSC02331.JPG	Big Mopane Trees. Conservation area.	
15	Tete	Magoe	2014/8/28	13:58	Kawai	TE018	-15°50'21"	31°51'25"	433	Thicket	Old	~10m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02341.JPG	DSC02342.JPG	DSC02343.JPG	DSC02344.JPG	DSC02345.JPG	DSC02346.JPG	DSC02347.JPG	DSC02348.JPG	Deciduous Thicket.	
16	Tete	Magoe	2014/8/28	14:16	Kawai	TE019	-15°48'57"	31°48'09"	501	Deciduous	Old	~10m	Open	Good	None	Dried grass	Medium	SW	Medium	Brown	Medium	DSC02362.JPG	DSC02363.JPG	DSC02364.JPG	DSC02365.JPG	DSC02366.JPG	DSC02367.JPG	DSC02368.JPG	DSC02369.JPG		*Messasa branca, Combretum*
17	Tete	Magoe	2014/8/28	14:36	Kawai	TE020	-15°48'39"	31°46'07"	488	Deciduous	Old	~10m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02384.JPG	DSC02385.JPG	DSC02386.JPG	DSC02387.JPG	DSC02388.JPG	DSC02389.JPG	DSC02390.JPG	DSC02391.JPG	Deciduous forest and Shrubs.	*Combretum*
18	Tete	Moatize	2014/8/29	11:03	Kawai	TE021	-16°03'39"	33°52'09"	330	Deciduous	Old	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02446.JPG	DSC02447.JPG	DSC02448.JPG	DSC02449.JPG	DSC02450.JPG	DSC02451.JPG	DSC02452.JPG	DSC02453.JPG		*Combretum, Diplorinchys*
19	Tete	Moatize	2014/8/29	11:35	Kawai	TE022	-15°55'17"	34°04'14"	372	Deciduous	Old	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02465.JPG	DSC02466.JPG	DSC02467.JPG	DSC02468.JPG	DSC02469.JPG	DSC02470.JPG	DSC02471.JPG	DSC02472.JPG	Poor soil area.	*Combretum, Sclerocarya birrea (DSC02473.JPG), Diplorinchys*
20	Tete	Moatize	2014/8/29	12:02	Kawai	TE023	-15°48'32"	34°11'13"	351	Grassland (Shrubland)	Old	~3m	Dense	Good	None	None	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC02479.JPG	DSC02480.JPG		
21	Tete	Moatize	2014/8/29	12:24	Kawai	TE024	-15°48'12"	34°14'04"	375	Grassland (Shrubland)	Young	~3m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02494.JPG	DSC02495.JPG	DSC02496.JPG	DSC02497.JPG	DSC02499.JPG	DSC02500.JPG	DSC02501.JPG	DSC02502.JPG	Former Field crop area. Now Shrubland.	
22	Tete	Moatize	2014/8/29	12:49	Kawai	TE025	-15°43'41"	34°20'26"	602	Field Crops	-	0m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02513.JPG	DSC02514.JPG	DSC02515.JPG	DSC02516.JPG	DSC02517.JPG	DSC02518.JPG	DSC02519.JPG	DSC02520.JPG	Parmanent agriculture area.	*Beans, Maize*
23	Tete	Moatize	2014/8/29	13:23	Kawai	TE026	-15°36'37"	34°18'23"	718	Field Crops (CFX)	-	~3m	Open	Good	None	Dried grass	Medium	E	Medium	Brown	Small	DSC02528.JPG	DSC02529.JPG	DSC02530.JPG	DSC02531.JPG	DSC02532.JPG	DSC02533.JPG	DSC02534.JPG	DSC02535.JPG	Agricultural area. Formar Miombo forest. Shifting cultivation.	*Maize, Beans (sometime)*
24	Tete	Tsangano	2014/8/29	14:14	Kawai	TE027	-15°10'45"	34°17'53"	1,152	Semi-Evergreen	Old	~10m	Open	Good	None	Grass (H=1m)	Gentle	E	Medium	Brown	Sand	DSC02548.JPG	DSC02549.JPG	DSC02550.JPG	DSC02551.JPG	DSC02552.JPG	DSC02553.JPG	DSC02554.JPG	DSC02555.JPG	Semi-Evergreen forest (Landuse: Shifting cultivation w/ forest). Water contant soil.	*Uapaca, Parinali curateliforia*
25	Tete	Tsangano	2014/8/29	14:37	Kawai	TE028	-15°06'27"	34°17'32"	1,040	Field Crops	-	~3m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02571.JPG	DSC02572.JPG	DSC02573.JPG	DSC02574.JPG	DSC02575.JPG	DSC02576.JPG	DSC02577.JPG	DSC02578.JPG	Irrigation canals are located (DSC02580-81.JPG).	*Maize (DSC02582.JPG), Banana (DSC02579.JPG), Peanut*
26	Tete	Tsangano	2014/8/29	15:10	Kawai	TE029	-15°01'35"	34°18'41"	1,093	Miombo	Old	~15m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02590.JPG	DSC02591.JPG	DSC02592.JPG	DSC02593.JPG	DSC02594.JPG	DSC02595.JPG	DSC02596.JPG	DSC02597.JPG	Typical Miombo.	
27	Tete	Tsangano	2014/8/29	15:31	Kawai	TE030	-15°02'02"	34°17'22"	1,024	Miombo	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02611.JPG	DSC02612.JPG	DSC02613.JPG	DSC02614.JPG	DSC02615.JPG	DSC02616.JPG	DSC02617.JPG	DSC02618.JPG	Typical Miombo.	*Brachystegia spiciformis, Brachystegia bohemii, Burkea africana, Pterocarpus angolensis, Diplorinchys, Combretum*
28	Tete	Tsangano	2014/8/29	16:02	Kawai	TE031	-14°50'56"	34°20'30"	1,113	Field Crops	-	0m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02630.JPG	DSC02631.JPG	DSC02632.JPG	DSC02633.JPG	DSC02634.JPG	DSC02635.JPG	DSC02636.JPG	DSC02637.JPG		*Maize*
29	Tete	Angonia	2014/8/30	9:50	Kawai	TE032	-14°32'43"	34°08'37"	1,289	Field Crops	Old	0m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02657.JPG	DSC02658.JPG	DSC02659.JPG	DSC02660.JPG	DSC02661.JPG	DSC02662.JPG	DSC02663.JPG	DSC02664.JPG		*Maize, Mango*
30	Tete	Angonia	2014/8/30	10:16	Kawai	TE033	-14°32'56"	34°03'12"	1,233	Miombo	Medium	~10m	Dense	Good	None	None	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC02670.JPG	DSC02674.JPG	This area is known as "cemetereo." Because this area is owned and managed by local residents, photos were taken from outside of the forest.	*Brachystegia spiciformis*
31	Tete	Macanga	2014/8/30	11:42	Kawai	TE035	-14°40'13"	33°44'32"	1,295	Miombo	Old	~15m	Dense	Good	Burned	Dried grass	Gentle	SE	Long	Brown	Sand	DSC02707.JPG	DSC02708.JPG	DSC02709.JPG	DSC02710.JPG	DSC02711.JPG	DSC02712.JPG	DSC02713.JPG	DSC02714.JPG	Pure Miombo (deciduous) forest.	*Brachystegia spiciformis*
32	Tete	Macanga	2014/8/30	12:50	Kawai	TE036	-14°45'17"	33°34'32"	1,313	Miombo (Semi-Evergreen)	Old	~15m	Medium	Good	Burned	Dried grass	Gentle	N	Medium	Brown	Sand	DSC02735.JPG	DSC02736.JPG	DSC02737.JPG	DSC02738.JPG	DSC02739.JPG	DSC02740.JPG	DSC02741.JPG	DSC02742.JPG	Pure Miombo (semi-evergreen) forest. Soil condition is nice.	*Brachystegia spiciformis (DSC02746.JPG), Uapaca (DSC02747-49.JPG)*
33	Tete	Macanga	2014/8/30	13:37	Kawai	TE037	-14°33'07"	33°26'12"	1,336	Miombo	Old	~15m	Dense	Good	None	Dried grass	Gentle	NW	Long	Brown	Sand	DSC02756.JPG	DSC02757.JPG	DSC02758.JPG	DSC02759.JPG	DSC02760.JPG	DSC02761.JPG	DSC02762.JPG	DSC02763.JPG		*Brachystegia spiciformis*
34	Tete	Macanga	2014/8/30	14:09	Kawai	TE038	-14°26'55"	33°19'31"	1,041	Miombo	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02771.JPG	DSC02772.JPG	DSC02773.JPG	DSC02774.JPG	DSC02775.JPG	DSC02776.JPG	DSC02777.JPG	DSC02778.JPG		
35	Tete	Chifunde	2014/8/30	14:43	Kawai	TE039	-14°24'10"	33°07'55"	815	Miombo	Old	~15m	Open	Good	None	Vegetation, Dried grass	Flat	None	None	Brown	Sand	DSC02789.JPG	DSC02790.JPG	DSC02791.JPG	DSC02792.JPG	DSC02793.JPG	DSC02794.JPG	DSC02795.JPG	DSC02796.JPG	More open Miombo compared with TE38 were found.	*Brachystegia spiciformis, Brachystegia bohemii, Combretum*
36	Tete	Macanga	2014/9/1	9:00	Kawai	TE042	-15°04'49"	33°17'43"	610	Deciduous	Old	~10m	Open	Good	Burned	Dried grass	Flat	None	None	Brown	Sand	DSC02805.JPG	DSC02806.JPG	DSC02807.JPG	DSC02808.JPG	DSC02809.JPG	DSC02810.JPG	DSC02811.JPG	DSC02812.JPG		*Acacia, Combretum, Diplorinchys*
37	Tete	Chiuta	2014/9/1	9:36	Kawai	TE043	-15°08'05"	33°12'32"	546	Deciduous	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02828.JPG	DSC02829.JPG	DSC02830.JPG	DSC02831.JPG	DSC02832.JPG	DSC02833.JPG	DSC02834.JPG	DSC02835.JPG	Some trees are Mopane. Mopane trees are cut for chacoal (DSC02845-46.JPG).	
38	Tete	Chifunde	2014/9/1	10:57	Kawai	TE045	-14°59'59"	32°47'18"	513	Deciduous	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02852.JPG	DSC02853.JPG	DSC02854.JPG	DSC02855.JPG	DSC02856.JPG	DSC02857.JPG	DSC02858.JPG	DSC02859.JPG		*Acacia, Combretum, Diplorinchys*
39	Tete	Chifunde	2014/9/1	11:26	Kawai	TE046	-14°52'14"	32°37'34"	482	Deciduous	Old	~10m	Open	Good	Burned	Dried grass	Flat	None	None	Brown	Sand	DSC02867.JPG	DSC02868.JPG	DSC02869.JPG	DSC02870.JPG	DSC02871.JPG	DSC02872.JPG	DSC02873.JPG	DSC02874.JPG		
40	Tete	Chifunde	2014/9/1	11:56	Kawai	TE047	-14°42'09"	32°32'40"	563	Field Crops	-	0m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02883.JPG	DSC02884.JPG	DSC02885.JPG	DSC02886.JPG	DSC02887.JPG	DSC02888.JPG	DSC02889.JPG	DSC02890.JPG	Mopane were found within forest areas a long way from the survey point.	*Maize, Papaia, Tobacco*
41	Tete	Chifunde	2014/9/1	13:28	Kawai	TE048	-14°25'57"	32°25'49"	798	Miombo	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC02910.JPG	DSC02911.JPG	DSC02912.JPG	DSC02913.JPG	DSC02914.JPG	DSC02915.JPG	DSC02916.JPG	DSC02917.JPG	Typical Miombo.	*Brachystegia spiciformis*
42	Tete	Maravia	2014/9/2	17:44	Kawai	TE050	-14°56'43"	31°36'16"	955	Deciduous	Old	~10m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC03055.JPG	DSC03056.JPG		
43	Tete	Zumbu	2014/9/2	16:29	Kawai	TE052	-14°58'56"	31°16'22"	905	Grassland (Bamboo)	Medium	~5m	Dense	-	Burned	None	Flat	None	None	Brown	Sand	DSC03036.JPG	DSC03037.JPG	DSC03038.JPG	DSC03039.JPG	DSC03040.JPG	DSC03041.JPG	DSC03042.JPG	DSC03043.JPG		
44	Tete	Zumbu	2014/9/2	15:35	Kawai	TE053	-15°05'45"	30°59'24"	902	Miombo	Old	~15m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC03017.JPG	DSC03018.JPG	DSC03019.JPG	DSC03020.JPG	DSC03021.JPG	DSC03022.JPG	DSC03023.JPG	DSC03024.JPG	Pure Miombo area.	*Brachystegia spiciformis*
45	Tete	Zumbu	2014/9/2	11:57	Kawai	TE054	-15°05'28"	30°49'47"	975	Deciduous	Old	~15m	Open	Good	None	None	Gentle	N	Medium	Brown	Sand	DSC02935.JPG	DSC02936.JPG	DSC02937.JPG	DSC02938.JPG	DSC02939.JPG	DSC02940.JPG	DSC02941.JPG	DSC02942.JPG	Deciduous Miombo, but not typical. Better to classify as Deciduous forest.	
46	Tete	Zumbu	2014/9/2	12:26	Kawai	TE055	-15°03'04"	30°49'21"	964	Miombo	Old	~15m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC02956.JPG	DSC02957.JPG	DSC02958.JPG	DSC02959.JPG	DSC02960.JPG	DSC02961.JPG	DSC02962.JPG	DSC02963.JPG	Typical Miombo.	*Brachystegia spiciformis*
47	Tete	Zumbu	2014/9/2	12:52	Kawai	TE056	-15°00'20"	30°49'45"	978	Miombo	Old	~15m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC02976.JPG	DSC02977.JPG	DSC02978.JPG	DSC02979.JPG	DSC02980.JPG	DSC02981.JPG	DSC02982.JPG	DSC02983.JPG	Typical Miombo. Ecological region Miombo.	
48	Tete	Zumbu	2014/9/2	13:40	Kawai	TE057	-14°51'31"	30°50'40"	906	Deciduous	Old	~15m	Open	Good	Burned	Dried grass	Flat	None	None	Brown	Sand	DSC02997.JPG	DSC02998.JPG	DSC02999.JPG	DSC03000.JPG	DSC03001.JPG	DSC03002.JPG	DSC03003.JPG	DSC03004.JPG		
49	Tete	Maravia	2014/9/3	8:31	Kawai	TE059	-14°57'46"	31°47'16"	1,053	Miombo	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03067.JPG	DSC03068.JPG	DSC03069.JPG	DSC03070.JPG	DSC03071.JPG	DSC03072.JPG	DSC03073.JPG	DSC03074.JPG		*Brachystegia spiciformis*
50	Tete	Maravia	2014/9/3	9:33	Kawai	TE060	-14°48'42"	31°45'32"	1,056	Deciduous	Old	~10m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC03090.JPG	DSC03091.JPG	DSC03092.JPG	DSC03093.JPG	DSC03094.JPG	DSC03095.JPG	DSC03096.JPG	DSC03097.JPG	Deciduous forest with some Miombo forest.	
51	Tete	Maravia	2014/9/3	10:12	Kawai	TE062	-14°45'42"	31°42'32"	1,076	Grassland	-	0m	Open	-	Burned	None	Flat	None	None	Brown	Sand	DSC03110.JPG	DSC03111.JPG	DSC03112.JPG	DSC03113.JPG	DSC03114.JPG	DSC03115.JPG	DSC03116.JPG	DSC03117.JPG	Wooded grassland (Grassland with forest).	
52	Tete	Maravia	2014/9/3	10:26	Kawai	TE063	-14°45'17"	31°42'08"	1,074	Miombo	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03134.JPG	DSC03135.JPG	DSC03136.JPG	DSC03137.JPG	DSC03138.JPG	DSC03139.JPG	DSC03140.JPG	DSC03141.JPG		*Brachystegia bohemii, Brachystegia spiciformis*
53	Tete	Moatize	2014/9/4	10:07	Kawai	TE064	-16°13'19"	34°17'28"	282	Deciduous	Old	~15m	Open	Good	Selective	Dried grass	Flat	None	None	Brown	Sand	DSC03153.JPG	DSC03154.JPG	DSC03155.JPG	DSC03156.JPG	DSC03157.JPG	DSC03158.JPG	DSC03159.JPG	DSC03160.JPG	Mix forest (Mopane and Deciduous).	
54	Tete	Mutarara	2014/9/4	10:53	Kawai	TE065	-16°20'58"	34°22'06"	295	Mopane	Old	~20m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03180.JPG	DSC03181.JPG	DSC03182.JPG	DSC03183.JPG	DSC03184.JPG	DSC03185.JPG	DSC03186.JPG	DSC03187.JPG	Big Mopane trees area.	
55	Tete	Mutarara	2014/9/4	11:43	Kawai	TE066	-16°29'12"	34°28'23"	193	Deciduous	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03208.JPG	DSC03209.JPG	DSC03210.JPG	DSC03211.JPG	DSC03212.JPG	DSC03213.JPG	DSC03214.JPG	DSC03215.JPG		*Combretum imberbe (Local name: Monzo)*
56	Tete	Mutarara	2014/9/4	12:08	Kawai	TE067	-16°30'04"	34°29'11"	179	Evergreen	Old	~10m	Dense	Good	None	Vegetation	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC03231.JPG	DSC03232.JPG	As a result of interviews with local residents, it was found that the entrance of this site is forbidden due to landmines.	

Table 9 Results of the GT Survey in Niassa Province

UID	Province	District	Date	Time	Surveyor	Point No.	GPS ID	Latitude (N)	Longitude (E)	Elevation (m)	Forest Type in Field						Understory	Slope			Soil		Photo No								Comments 1	Comments 2 (Spices)
											General	Age	Height	Density	Health	Others		Angle	Direction	Length	Color	Texture	North	East	South	West	Above	Ground	Distance View	Near View		
1	Niassa	Lichinga	2014/9/24	10:12	Kawai	NS001	074	-13°18'56"	35°13'46"	1,307	Evergreen (Plantation)	Old	~20m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC04726.JPG	DSC04727.JPG		*Pine*
2	Niassa	Lichinga	2014/9/24	10:34	Kawai	NS002	075	-13°17'08"	35°14'34"	1,357	Grassland (Bush)	-	~3m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC04746.JPG	DSC04747.JPG	DSC04748.JPG	DSC04749.JPG	DSC04750.JPG	DSC04751.JPG	DSC04752.JPG	DSC04753.JPG		
3	Niassa	Lichinga	2014/9/24	11:23	Kawai	NS003	076	-13°18'24"	35°11'27"	1,238	Thicket	Young	~3m	Open	Good	None	Dried grass	Medium	N	Medium	Brown	Medium	DSC04778.JPG	DSC04779.JPG	DSC04780.JPG	DSC04781.JPG	DSC04782.JPG	DSC04783.JPG	DSC04784.JPG	DSC04785.JPG	Poor soil area. Original Thicket.	
4	Niassa	Lichinga	2014/9/24	9:26	Kawai	NS004	073	-13°18'39"	35°18'45"	1,339	Evergreen (Plantation)	Old (40-50	~20m	Dense	Good	Selective	None	Flat	None	None	Brown	Sand	DSC04707.JPG	DSC04708.JPG	DSC04709.JPG	DSC04710.JPG	DSC04711.JPG	DSC04712.JPG	DSC04713.JPG	DSC04714.JPG		*Pine*
5	Niassa	Lichinga	2014/9/24	9:00	Kawai	NS005	072	-13°18'21"	35°17'40"	1,327	Shrubland (CFX)	-	0m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	-	-	-	-	-	-	DSC04687.JPG	DSC04688.JPG	Shrubland. Former Field Crops.	
6	Niassa	Lichinga	2014/9/24	8:31	Kawai	NS006	071	-13°21'32"	35°14'40"	1,325	Evergreen (Plantation)	Young (6 y	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04663.JPG	DSC04664.JPG	DSC04665.JPG	DSC04666.JPG	DSC04667.JPG	DSC04668.JPG	DSC04669.JPG	DSC04670.JPG		*Pine*
7	Niassa	Sanga	2014/9/16	9:56	Kawai	NS007	06	-12°56'47"	35°09'43"	1,335	Semi-Evergreen	Old (20- y	~10m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03241.JPG	DSC03242.JPG	DSC03243.JPG	DSC03244.JPG	DSC03245.JPG	DSC03246.JPG	DSC03247.JPG	DSC03248.JPG		*Uapaca*
8	Niassa	Sanga	2014/9/16	10:37	Kawai	NS009	07	-12°57'47"	35°06'53"	1,339	Semi-Evergreen	Old	~10m	Open	Good	None	Re-generation	Gentle	W	Medium	Brown	Sand	DSC03262.JPG	DSC03263.JPG	DSC03264.JPG	DSC03265.JPG	DSC03266.JPG	DSC03267.JPG	DSC03268.JPG	DSC03269.JPG		*Uapaca*
9	Niassa	Lago	2014/9/16	11:13	Kawai	NS010	08	-12°50'32"	35°01'27"	1,220	Evergreen (Plantation)	Young (5-6	~8m	Dense	Good	None	Dried grass	Gentle	NW	Medium	Brown	Sand	DSC03289.JPG	DSC03290.JPG	DSC03291.JPG	DSC03292.JPG	DSC03293.JPG	DSC03294.JPG	DSC03295.JPG	DSC03296.JPG		*Pine*
10	Niassa	Lago	2014/9/16	11:57	Kawai	NS012	09	-12°43'27"	34°57'36"	1,108	Semi-Evergreen	Medium	~10m	Open	Good	None	Vegetation	Medium	W	Medium	Brown	Sand	DSC03318.JPG	DSC03319.JPG	DSC03320.JPG	DSC03321.JPG	DSC03322.JPG	DSC03323.JPG	DSC03324.JPG	DSC03325.JPG		*Uapaca, Combretum, Diplorinchys*
11	Niassa	Lago	2014/9/16	12:41	Kawai	NS013	010	-12°40'44"	34°56'50"	1,244	Miombo	Old	~15m	Medium	Good	None	Vegetation	Medium	W	Medium	Brown	Sand	DSC03347.JPG	DSC03348.JPG	DSC03349.JPG	DSC03350.JPG	DSC03351.JPG	DSC03354.JPG	DSC03352.JPG	DSC03353.JPG		*Brachystegia spiciformis, Brachystegia bohemii, Combretum, Terminalia sericea*
12	Niassa	Lago	2014/9/16	13:15	Kawai	NS014	011	-12°41'53"	34°54'46"	905	Miombo	Old	~15m	Medium	Good	None	Dried grass	Steep	NE	Long	Brown	Sand	DSC03371.JPG	DSC03372.JPG	DSC03373.JPG	DSC03374.JPG	DSC03375.JPG	DSC03376.JPG	DSC03377.JPG	DSC03378.JPG		
13	Niassa	Lago	2014/9/16	13:50	Kawai	NS015	012	-12°40'39"	34°48'26"	512	Grassland (Shrub)	-	~3m	Open	Good	None	Vegetation	Gentle	W	Medium	Brown	Rock	DSC03391.JPG	DSC03392.JPG	DSC03393.JPG	DSC03394.JPG	DSC03395.JPG	DSC03396.JPG	DSC03397.JPG	DSC03398.JPG		
14	Niassa	Muembe	2014/9/17	9:44	Kawai	NS016	015	-13°01'26"	35°43'14"	1,169	Miombo	Old	~15m	Medium	Good	None	Dried grass	Gentle	S	Long	Brown	Sand	DSC03413.JPG	DSC03414.JPG	DSC03415.JPG	DSC03416.JPG	DSC03417.JPG	DSC03418.JPG	DSC03419.JPG	DSC03420.JPG	Semi-Evergreen forest.	*Brachystegia spiciformis (DSC03427-28.JPG), Pseodolastilys maproneifolia, Uapaca*
15	Niassa	Muembe	2014/9/17	10:39	Kawai	NS017	016	-12°53'15"	35°42'46"	1,603	Grassland (Plantation)	Young	~3m	Open	Good	None	Dried grass	Gentle	N	Medium	Brown	Sand	DSC03446.JPG	DSC03447.JPG	DSC03448.JPG	DSC03449.JPG	DSC03450.JPG	DSC03451.JPG	DSC03452.JPG	DSC03453.JPG	Former shrubland. Just planted pine trees (around 2 years ago).	
16	Niassa	Muembe	2014/9/17	11:01	Kawai	NS018	017	-12°52'35"	35°42'02"	1,586	Deciduous	Old	~10m	Open	Good	Burned	None	Gentle	W	Long	Brown	Sand	DSC03470.JPG	DSC03471.JPG	DSC03472.JPG	DSC03473.JPG	DSC03474.JPG	DSC03475.JPG	DSC03476.JPG	DSC03477.JPG		*Parinari curatilifolia*
17	Niassa	Muembe	2014/9/17	11:52	Kawai	NS019	018	-12°52'44"	35°44'55"	1,406	Evergreen (Plantation)	Old (30- y	~30m	Dense	Good	Burned	None	Gentle	W	Medium	Brown	Sand	DSC03501.JPG	DSC03502.JPG	DSC03503.JPG	DSC03504.JPG	DSC03505.JPG	DSC03506.JPG	DSC03507.JPG	DSC03508.JPG		*Eucalibto*
18	Niassa	Muembe	2014/9/17	12:22	Kawai	NS022	019	-12°54'04"	35°46'16"	1,341	Grassland (Shrub)	-	~3m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC03521.JPG	DSC03522.JPG	DSC03523.JPG	DSC03524.JPG	DSC03525.JPG	DSC03526.JPG	DSC03527.JPG	DSC03528.JPG		
19	Niassa	Muembe	2014/9/17	12:55	Kawai	NS023	020	-12°50'02"	35°50'36"	1,194	Miombo	Old	~15m	Medium	Good	None	Vegetation	Gentle	W	Medium	Brown	Sand	DSC03545.JPG	DSC03546.JPG	DSC03547.JPG	DSC03548.JPG	DSC03549.JPG	DSC03550.JPG	DSC03551.JPG	DSC03552.JPG		*Brachystegia spiciformis, Uapaca*
20	Niassa	Sanga	2014/9/17	15:03	Kawai	NS024	021	-12°47'00"	35°25'33"	1,022	Miombo	Old	~15m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC03567.JPG	DSC03568.JPG	DSC03569.JPG	DSC03570.JPG	DSC03571.JPG	DSC03572.JPG	DSC03573.JPG	DSC03574.JPG		*Brachystegia spiciformis, Brachystegia bohemii*
21	Niassa	Sanga	2014/9/17	15:37	Kawai	NS025	022	-12°35'59"	35°25'12"	970	Miombo	Old	~10m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC03588.JPG	DSC03589.JPG	DSC03590.JPG	DSC03591.JPG	DSC03592.JPG	DSC03593.JPG	DSC03594.JPG	DSC03595.JPG		*Brachystegia spiciformis, Brachystegia bohemii*
22	Niassa	Majune	2014/9/18	10:30	Kawai	NS027	023	-13°23'13"	36°13'59"	644	Miombo	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03611.JPG	DSC03612.JPG	DSC03613.JPG	DSC03614.JPG	DSC03615.JPG	DSC03616.JPG	DSC03617.JPG	DSC03618.JPG		*Brachystegia spiciformis, Brachystegia bohemii, Combretum*
23	Niassa	Majune	2014/9/18	12:03	Kawai	NS028	024	-13°25'27"	36°36'59"	671	Deciduous	Old	~10m	Open	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC03676.JPG	DSC03677.JPG	DSC03678.JPG	DSC03679.JPG	DSC03680.JPG	DSC03681.JPG	DSC03682.JPG	DSC03683.JPG		
24	Niassa	Majune	2014/9/18	12:24	Kawai	NS029	025	-13°22'49"	36°41'11"	671	Deciduous	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03698.JPG	DSC03699.JPG	DSC03700.JPG	DSC03701.JPG	DSC03702.JPG	DSC03703.JPG	DSC03704.JPG	DSC03705.JPG		*Combretum, Pseodolastilys maproneifolia, Brachystegia bohemii*
25	Niassa	Majune	2014/9/18	12:43	Kawai	NS030	026	-13°22'00"	36°45'53"	659	Deciduous	Old	~10m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC03721.JPG	DSC03722.JPG	DSC03723.JPG	DSC03724.JPG	DSC03725.JPG	DSC03726.JPG	DSC03727.JPG	DSC03728.JPG		
26	Niassa	Majune	2014/9/18	12:59	Kawai	NS031	027	-13°24'12"	36°49'04"	699	Miombo	Old	~15m	Open	Good	None	Dried grass	Gentle	S	Medium	Brown	Sand	DSC03749.JPG	DSC03750.JPG	DSC03751.JPG	DSC03752.JPG	DSC03753.JPG	DSC03754.JPG	DSC03755.JPG	DSC03756.JPG		*Brachystegia spiciformis*
27	Niassa	Marrupa	2014/9/18	13:25	Kawai	NS032	028	-13°23'39"	36°58'10"	807	Miombo	Old	~15m	Open	Good	None	Dried grass	Gentle	N	Medium	Brown	Sand	DSC03770.JPG	DSC03771.JPG	DSC03772.JPG	DSC03773.JPG	DSC03774.JPG	DSC03775.JPG	DSC03776.JPG	DSC03777.JPG		
28	Niassa	Marrupa	2014/9/18	14:05	Kawai	NS033	029	-13°20'14"	37°17'37"	702	Miombo	Old	~15m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC03799.JPG	DSC03800.JPG	DSC03801.JPG	DSC03802.JPG	DSC03803.JPG	DSC03804.JPG	DSC03805.JPG	DSC03806.JPG		*Brachystegia spiciformis*
29	Niassa	Marrupa	2014/9/19	7:46	Kawai	NS034	034	-13°06'01"	37°40'44"	754	Miombo	Old	~15m	Open	Good	None	Dried grass	Gentle	W	Medium	Brown	Sand	DSC03820.JPG	DSC03821.JPG	DSC03822.JPG	DSC03823.JPG	DSC03824.JPG	DSC03825.JPG	DSC03826.JPG	DSC03827.JPG		*Brachystegia spiciformis*
30	Niassa	Marrupa	2014/9/19	8:33	Kawai	NS035	035	-12°57'10"	37°39'38"	665	Field Crops (CFX)	Young	~3m	Open	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC03842.JPG	DSC03843.JPG	DSC03844.JPG	DSC03845.JPG	DSC03846.JPG	DSC03847.JPG	DSC03848.JPG	DSC03849.JPG		*Marrupa (like a Maize)*
31	Niassa	Marrupa	2014/9/19	9:06	Kawai	NS036	036	-12°51'31"	37°41'19"	528	Grassland	-	0m	Open	-	Clear-cut	None	Flat	None	None	Brown	Sand	DSC03870.JPG	DSC03871.JPG	DSC03872.JPG	DSC03873.JPG	DSC03874.JPG	DSC03875.JPG	DSC03876.JPG	DSC03877.JPG	Miombo trees are cut.	
32	Niassa	Marrupa	2014/9/19	9:34	Kawai	NS037	037	-12°46'41"	37°42'55"	456	Deciduous	Old	~15m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC03897.JPG	DSC03898.JPG	DSC03899.JPG	DSC03900.JPG	DSC03901.JPG	DSC03902.JPG	DSC03903.JPG	DSC03904.JPG		*Peanut, Maize*
33	Niassa	Marrupa	2014/9/19	10:22	Kawai	NS038	038	-12°29'12"	37°39'04"	336	Deciduous	Old	~10m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC03922.JPG	DSC03923.JPG	DSC03924.JPG	DSC03925.JPG	DSC03926.JPG	DSC03927.JPG	DSC03928.JPG	DSC03929.JPG	Niassa reserve.	
34	Niassa	Mecula	2014/9/19	10:58	Kawai	NS039	039	-12°24'05"	37°40'01"	323	Grassland	-	~3m	Open	Good	None	None	Flat	None	None	Brown	Sand	DSC03950.JPG	DSC03951.JPG	DSC03952.JPG	DSC03953.JPG	DSC03954.JPG	DSC03955.JPG	DSC03956.JPG	DSC03957.JPG		
35	Niassa	Mecula	2014/9/19	11:18	Kawai	NS040	040	-12°22'06"	37°39'33"	374	Miombo	Old	~15m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC03975.JPG	DSC03976.JPG	DSC03977.JPG	DSC03978.JPG	DSC03979.JPG	DSC03980.JPG	DSC03981.JPG	DSC03982.JPG		*Brachystegia spiciformis, Brachystegia bohemii, Pseodolastilys maproneifolia, Combretum*
36	Niassa	Mecula	2014/9/19	11:45	Kawai	NS041	041	-12°17'52"	37°39'21"	357	Deciduous	Old	~15m	Open	Good	Burned	Dried grass	Flat	None	None	Brown	Sand	DSC04000.JPG	DSC04001.JPG	DSC04002.JPG	DSC04003.JPG	DSC04004.JPG	DSC04005.JPG	DSC04006.JPG	DSC04007.JPG		
37	Niassa	Mecula	2014/9/19	12:22	Kawai	NS042	042	-12°11'22"	37°37'44"	420	Miombo	Old	~15m	Open	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC04023.JPG	DSC04024.JPG	DSC04025.JPG	DSC04026.JPG	DSC04027.JPG	DSC04028.JPG	DSC04029.JPG	DSC04030.JPG		*Brachystegia spiciformis*
38	Niassa	Mecula	2014/9/19	12:49	Kawai	NS043	043	-12°09'23"	37°33'06"	498	Miombo	Old	~15m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04042.JPG	DSC04043.JPG	DSC04044.JPG	DSC04045.JPG	DSC04046.JPG	DSC04047.JPG	DSC04048.JPG	DSC04049.JPG	Typical Miombo.	*Brachystegia spiciformis*
39	Niassa	Marrupa	2014/9/20	8:35	Kawai	NS044	044	-13°30'43"	37°50'00"	596	Deciduous	Old	~15m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC04065.JPG	DSC04066.JPG	DSC04067.JPG	DSC04068.JPG	DSC04069.JPG	DSC04070.JPG	DSC04071.JPG	DSC04072.JPG		
40	Niassa	Marrupa	2014/9/20	8:55	Kawai	NS045	045	-13°32'48"	37°50'35"	582	Miombo	Old	~15m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04093.JPG	DSC04094.JPG	DSC04095.JPG	DSC04096.JPG	DSC04097.JPG	DSC04098.JPG	DSC04099.JPG	DSC04100.JPG		*Brachystegia spiciformis*
41	Niassa	Nipepe	2014/9/20	10:37	Kawai	NS046	046	-13°50'20"	37°56'28"	496	Miombo	Old	~10m	Medium	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04117.JPG	DSC04118.JPG	DSC04119.JPG	DSC04120.JPG	DSC04121.JPG	DSC04122.JPG	DSC04123.JPG	DSC04124.JPG		*Brachystegia spiciformis*
42	Niassa	Nipepe	2014/9/20	11:49	Kawai	NS048	047	-14°00'42"	37°46'16"	543	Deciduous	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04143.JPG	DSC04144.JPG	DSC04145.JPG	DSC04146.JPG	DSC04147.JPG	DSC04148.JPG	DSC04149.JPG	DSC04150.JPG		
43	Niassa	Nipepe	2014/9/20	12:23	Kawai	NS049	048	-14°05'35"	37°32'15"	544	Deciduous	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04165.JPG	DSC04166.JPG	DSC04167.JPG	DSC04168.JPG	DSC04169.JPG	DSC04170.JPG	DSC04171.JPG	DSC04172.JPG		
44	Niassa	Maua	2014/9/20	12:53	Kawai	NS050	049	-14°08'09"	37°22'42"	540	Field Crops	-	~3m	Open	-	None	Dried grass	Flat	None	None	Brown	Sand	DSC04193.JPG	DSC04194.JPG	DSC04195.JPG	DSC04196.JPG	DSC04197.JPG	DSC04198.JPG	DSC04199.JPG	DSC04200.JPG		*Maize, Cassava, Beans*
45	Niassa	Maua	2014/9/20	13:25	Kawai	NS051	050	-14°04'50"	37°13'21"	576	Deciduous	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04212.JPG	DSC04213.JPG	DSC04214.JPG	DSC04215.JPG	DSC04216.JPG	DSC04217.JPG	DSC04218.JPG	DSC04219.JPG		
46	Niassa	Metarica	2014/9/20	14:21	Kawai	NS052	051	-14°12'26"	36°55'33"	592	Deciduous	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04236.JPG	DSC04237.JPG	DSC04238.JPG	DSC04239.JPG	DSC04240.JPG	DSC04241.JPG	DSC04242.JPG	DSC04243.JPG		
47	Niassa	Metarica	2014/9/20	14:56	Kawai	NS053	052	-14°20'40"	36°47'41"	629	Grassland (CFX)	-	~3m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04251.JPG	DSC04252.JPG	DSC04253.JPG	DSC04254.JPG	DSC04255.JPG	DSC04256.JPG	DSC04257.JPG	DSC04258.JPG		
48	Niassa	Mecanhelas	2014/9/22	9:18	Kawai	NS054	056	-15°04'23"	35°59'42"	679	Deciduous	Old	~10m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC04285.JPG	DSC04286.JPG	DSC04287.JPG	DSC04288.JPG	DSC04289.JPG	DSC04290.JPG	DSC04291.JPG	DSC04292.JPG	Deciduous forest with some Miombo trees.	
49	Niassa	Mecanhelas	2014/9/22	10:15	Kawai	NS055	057	-15°10'10"	35°50'53"	627	Grassland	-	0m	Open	Good	Burned	Dried grass	Flat	None	None	Brown	Sand	DSC04305.JPG	DSC04306.JPG	DSC04307.JPG	DSC04308.JPG	DSC04309.JPG	DSC04310.JPG	DSC04311.JPG	DSC04312.JPG		
50	Niassa	Mecanhelas	2014/9/22	10:33	Kawai	NS056	058	-15°10'06"	35°50'25"	628	Grassland	-	0m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04323.JPG	DSC04324.JPG	DSC04325.JPG	DSC04326.JPG	DSC04327.JPG	DSC04328.JPG	DSC04329.JPG	DSC04330.JPG		
51	Niassa	Mecanhelas	2014/9/22	10:47	Kawai	NS057	059	-15°09'59"	35°50'06"	629	Grassland	-	~3m	Dense	Good	None	None	Flat	None	None	Gray	Sand	DSC04339.JPG	DSC04340.JPG	DSC04341.JPG	DSC04342.JPG	DSC04343.JPG	DSC04344.JPG	DSC04345.JPG	DSC04346.JPG		
52	Niassa	Mecanhelas	2014/9/22	12:12	Kawai	NS061	060	-14°49'44"	35°56'05"	643	Deciduous	Old	~15m	Open	Good	Burned	Dried grass	Flat	None	None	Brown	Sand	DSC04368.JPG	DSC04369.JPG	DSC04370.JPG	DSC04371.JPG	DSC04372.JPG	DSC04373.JPG	DSC04374.JPG	DSC04375.JPG		
53	Niassa	Mecanhelas	2014/9/22	12:46	Kawai	NS062	061	-14°48'31"	35°57'38"	655	Deciduous	Old	~10m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC04393.JPG	DSC04394.JPG	DSC04395.JPG	DSC04396.JPG	DSC04397.JPG	DSC04398.JPG	DSC04399.JPG	DSC04400.JPG		
54	Niassa	Mecanhelas	2014/9/22	13:47	Kawai	NS064	062	-14°39'43"	35°59'49"	666	Deciduous	Old	~10m	Open	Good	Burned	None	Flat	None	None	Brown	Sand	DSC04418.JPG	DSC04419.JPG	DSC04420.JPG	DSC04421.JPG	DSC04422.JPG	DSC04423.JPG	DSC04424.JPG	DSC04425.JPG		
55	Niassa	Mecanhelas	2014/9/22	14:19	Kawai	NS065	063	-14°43'26"	36°10'05"	676	Miombo	Old	~15m	Medium	Good	Burned	None	Flat	None	None	Brown	Sand	DSC04446.JPG	DSC04447.JPG	DSC04448.JPG	DSC04449.JPG	DSC04450.JPG	DSC04451.JPG	DSC04452.JPG	DSC04453.JPG		*Brachystegia spiciformis*
56	Niassa	Mandimba	2014/9/23	9:57	Kawai	NS066	064	-13°57'19"	35°56'02"	718	Miombo	Old	~15m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04472.JPG	DSC04473.JPG	DSC04474.JPG	DSC04475.JPG	DSC04476.JPG	DSC04477.JPG	DSC04478.JPG	DSC04479.JPG		*Brachystegia spiciformis*
57	Niassa	Mandimba	2014/9/23	10:23	Kawai	NS067	065	-13°53'22"	35°55'22"	702	Miombo	Old	~15m	Dense	Good	None	None	Flat	None	None	Brown	Sand	DSC04503.JPG	DSC04504.JPG	DSC04505.JPG	DSC04506.JPG	DSC04507.JPG	DSC04508.JPG	DSC04509.JPG	DSC04510.JPG		*Brachystegia spiciformis*
58	Niassa	Ngauma	2014/9/23	10:52	Kawai	NS068	066	-13°46'26"	35°55'39"	749	Miombo	Old	~15m	Dense	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04528.JPG	DSC04529.JPG	DSC04530.JPG	DSC04531.JPG	DSC04532.JPG	DSC04533.JPG	DSC04534.JPG	DSC04535.JPG		*Brachystegia spiciformis*
59	Niassa	Ngauma	2014/9/23	11:13	Kawai	NS069	067	-13°43'50"	35°54'39"	750	Deciduous	Old	~10m	Open	Good	None	Dried grass	Flat	None	None	Brown	Sand	DSC04555.JPG	DSC04556.JPG	DSC04557.JPG	DSC04558.JPG	DSC04559.JPG	DSC04560.JPG	DSC04561.JPG	DSC04562.JPG		
60	Niassa	Ngauma	2014/9/23	12:04	Kawai	NS070	068	-13°44'08"	35°45'18"	889	Miombo	Old	~15m	Dense	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC04581.JPG	DSC04582.JPG	DSC04583.JPG	DSC04584.JPG	DSC04585.JPG	DSC04586.JPG	DSC04587.JPG	DSC04588.JPG		*Brachystegia spiciformis*
61	Niassa	Ngauma	2014/9/23	12:31	Kawai	NS071	069	-13°46'10"	35°41'01"	994	Miombo	Old	~15m	Medium	Good	None	Small vegetation	Flat	None	None	Brown	Sand	DSC04605.JPG	DSC04606.JPG	DSC04607.JPG	DSC04608.JPG	DSC04609.JPG	DSC04610.JPG	DSC04611.JPG	DSC04612.JPG		*Brachystegia spiciformis, Uapaca*
62	Niassa	Ngauma	2014/9/23	13:50	Kawai	NS072	070	-13°47'11"	35°22'35"	1,085	Grassland	-	0m	Open	-	Clear-cut	Dried grass	Flat	None	None	Brown	Sand	DSC04633.JPG	DSC04634.JPG	DSC04635.JPG	DSC04636.JPG	DSC04637.JPG	DSC04638.JPG	DSC04639.JPG	DSC04640.JPG	Former deciduous forest.	

Appendix24 Results of Field Surveys for the Development of Reference Year Maps

As described in 1.4 3, prior to the development of reference year maps, initial field surveys were conducted to check major forest cover change patterns in the Provinces of Gaza and Cabo Delgado. Appendix 24 shows results of these initial field surveys in order of (1) Preliminary analysis, (2) Interviews to local people, (3) Collection of field data, and (4) Examination of analysis flows based on the initial field surveys.

(1) Preliminary Analysis

Based on the past GT survey results and the colors of satellite imagery, survey points for the initial field surveys were determined. In this preliminary analysis, the Hansen Map, which includes forest and non-forest maps and multi-temporal analysis results for forest cover changes using LANDSAT imagery, and the comparison results of ALOS PALSAR and ALOS-2, radar satellite imagery from JAXA, were examined. Based on the analysis results, areas with a concentration of forest cover changes in the Provinces of Gaza and Cabo Delgado were estimated.

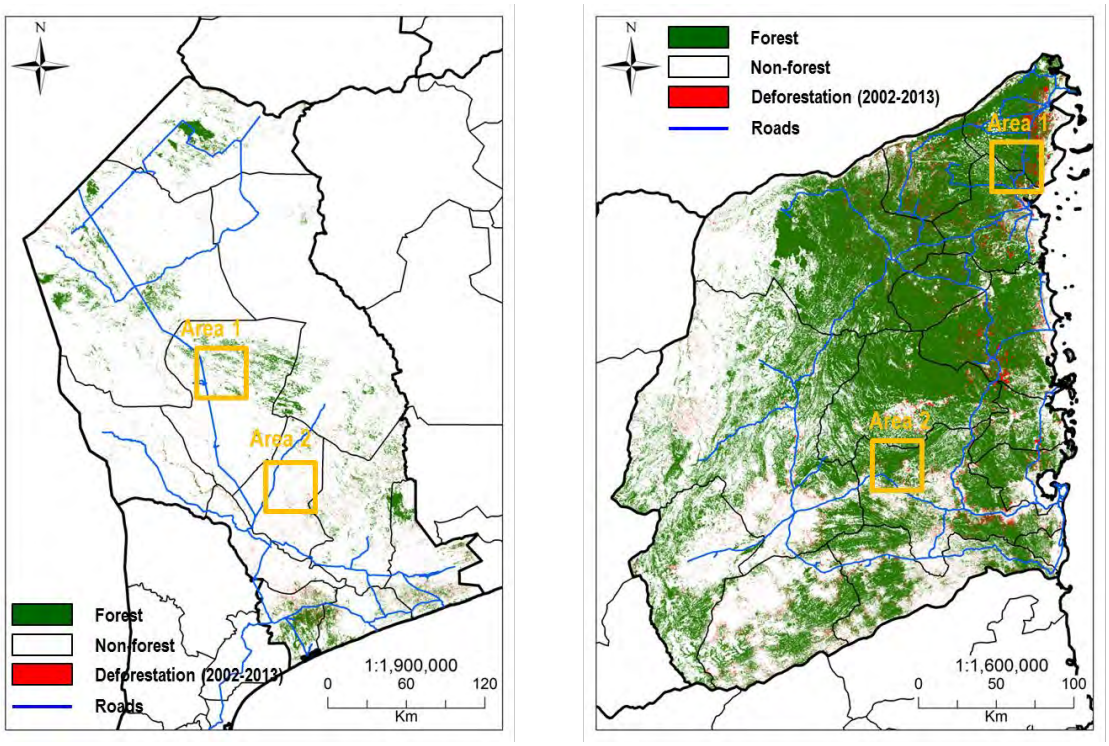

Figure 1: Estimation of Forest Cover Change Areas using the Hansen Map
(Source: Prepared by the Project Team using the Data from the University of Maryland, the U.S.)

More specifically, Hansen Map included not only the forest and non-forest map for the year 2000, but datasets about annual tree cover loss and tree cover gain during the total 11 years between 2002 and

2013. Figure 1 shows forest cover change areas after the year 2000 (red) on top of the 2000 forest and non-forest map. Using these maps, areas with a concentration of forest cover changes in these two target provinces were examined.

Similarly, using radar satellite imagery, backscatter coefficients at two different time periods were compared. Because backscatter coefficients are varied depending on land cover conditions, this feature makes it possible to estimate the area of land cover changes during a period of time. Figure 2 illustrates a difference in backscatter coefficients between the 2008 ALOS PALSAR and the 2015 ALOS-2 imagery. In this figure, the increase and decrease of backscatter coefficients were indicated in color (purple or green). These colored areas were interpreted as areas with forest cover changes between 2008 and 2015 in the Provinces of Gaza and Cabo Delgado, and using these maps, areas with a concentration of forest cover changes in these two provinces were estimated.

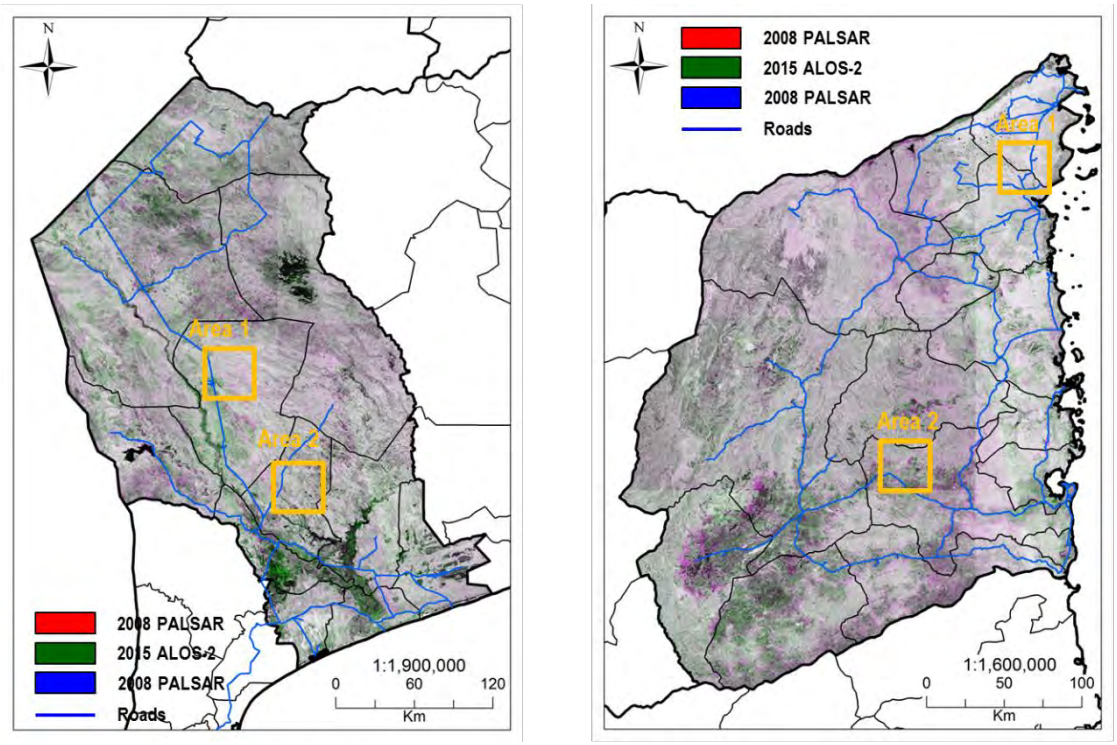

Figure 2: Estimation of Forest Cover Change Areas using ALOS PALSAR and ALOS-2 (Source: Prepared by the Project Team using the Data from JAXA)

The results of these satellite imagery data analyses enabled for estimating that forest cover changes often occurred in the Districts of Mabalane (Area 1) and Guijà (Area 2) in the Province of Gaza and the Districts of Palma and Mocímboa da Praia (Area 1) and Ancuabe (Area 2) in the Province of Cabo Delgado. These four areas were determined as target areas of the initial field surveys.

(2) Interviews to Local People

To examine the past forest changes at and around each survey point, interviews to local residents/farmers were conducted (Figure 3). Main questions to local residents/farmers included:

・In which village do you live? What are characteristics of the village (e.g. population and the number of households)?
・How do you travel from the village to the location? How long does it take?
・Why did you choose this location?
・What is a current land-cover/land-use type?
・What is an approximate area (estimated)?
・How many years ago did the change to a current land-cover/land-use type occur?
・What was a land-cover/land-use type before the change?
・What are possible causes of the change?


Figure 3: Interviews to Local People

(3) Collection of Field Data

The initial field surveys were conducted at 10 points in the Province of Gaza and 17 points in the Province of Cabo Delgado. Survey points were determined mainly in areas along roads or forest roads, and in particular, areas with unique features on satellite imagery were determined with the highest priority. At each survey point, surveyors verified a current land-cover/land-use type, latitude, longitude, and elevation. They also took photos of each survey point and their neighboring areas. Further, to better understand, the characteristics of neighboring forest areas were also checked. Figure 4 and 5 show survey points in the Provinces of Gaza and Cabo Delgado respectively.

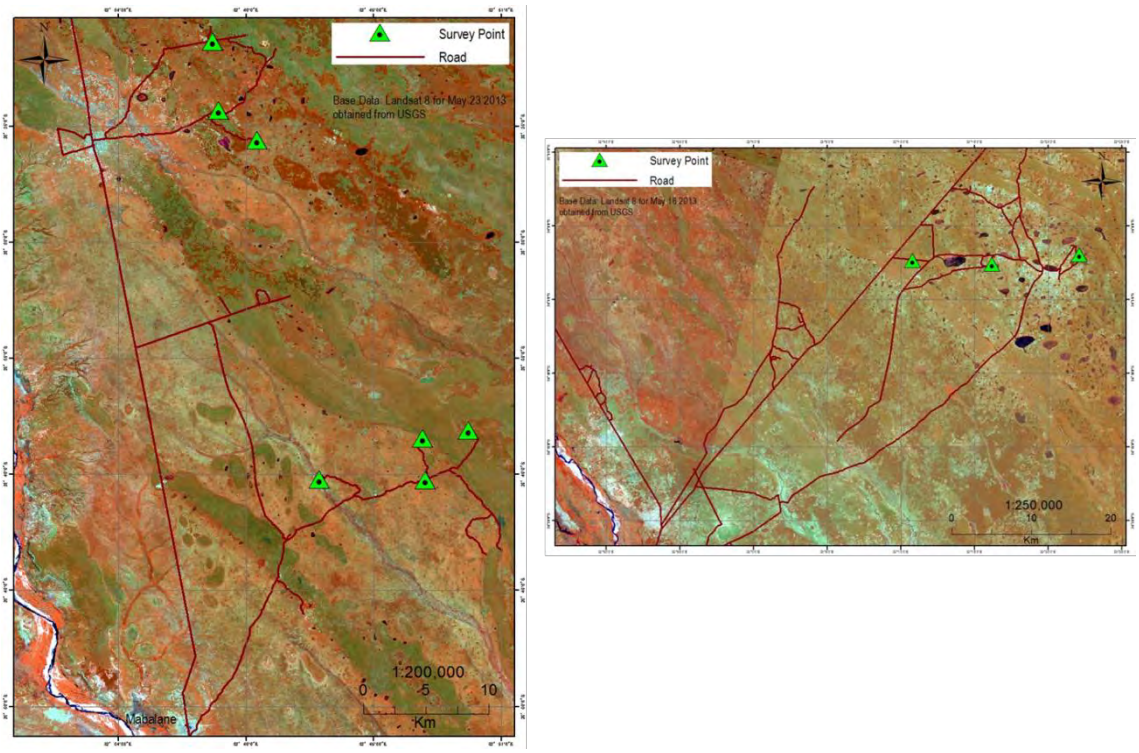

Figure 4: Survey Points in the Province of Gaza

(Left: the District of Mabalane, Right: the District of Guijà)

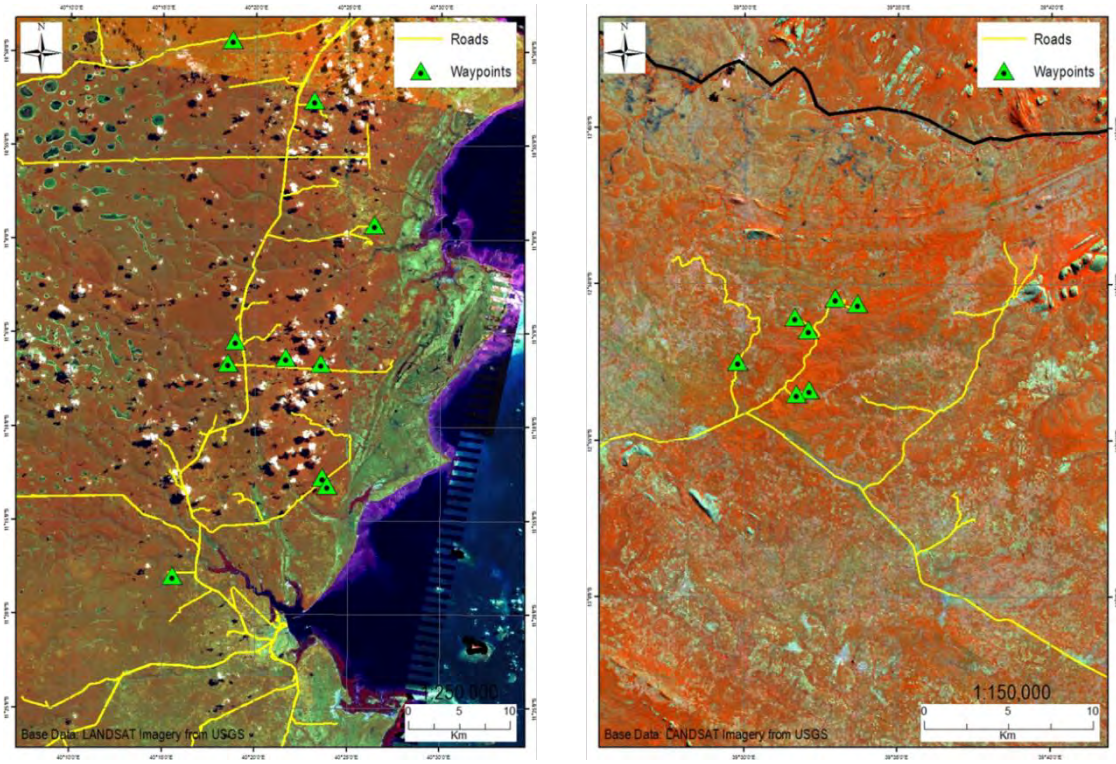

Figure 5: Survey Points in the Province of Cabo Delgado

(Left: the Districts of Palma and Mocímboa da Praia, Right: the District of Ancuabe)

Figure 6 shows the collection of field data at survey points. The left photo shows that a C/P officer checked a re-growing Mopane tree approximately eight years after the change occurred in this Mopane forest area. The right photo shows that two C/P officers checked original forests in neighboring areas of a survey point that is currently dominated by thicket.

Figure 6: Collection of Field Data at Survey Points

Table 1 and 2 show possible beginning periods of changes estimated from satellite imagery and current land-cover/land-use types verified in the initial field surveys for the Provinces of Gaza and Cabo Delgado respectively. For example, WP01 in Table 1 is interpreted as: "This area is currently classified as field crops. Because colors of satellite imagery changed between 2008 and 2010, it is estimated that a change from forest to field crops occurred between 2008 and 2010." Similarly, WP09 in Table 1 is interpreted as: "This area is currently classified as open Mopane forest. Because colors of satellite imagery changed between 2008 and 2010, it is estimated that a change from dense Mopane forest to open Mopane forest due to selective cutting occurred between 2008 and 2010." Further, WP08 in Table 2 is interpreted as: "This area is currently classified as thicket. Because colors of satellite imagery changed between 2002 and 2005, it is estimated that a change from forest to field crops occurred between 2002 and 2005. Moreover, colors in satellite imagery of 2008 are also different from satellite imagery of 2002 and 2005. Together with the previous change, therefore, it is estimated that after the change from forest to field crops occurred, a certain period of time passed, and another change from field crops to thicket also occurred after the year 2005."

Table 1: Survey Results for the Province of Gaza

No.	District	Estimated Time Period of Change (Interpreted from LANDSAT)					Current Land-cover/Land-use Type
		-02	02-05	05-08	08-10	10-13	
WP01	Mabalane				○		Field Crops
WP02	Mabalane		○				Field Crops
WP03	Mabalane				○		Field Crops
WP09	Mabalane				○		Mopane Forest (Open)
WP10	Mabalane				○		Mopane Forest (Open)
WP11	Mabalane				○		Mopane Forest (Open)
WP14	Mabalane				○		Deciduous Forest (Open)
WP15	Guijà		○				Field Crops
WP17	Guijà				○		Field Crops
WP18	Guijà		○				Field Crops

Table 2: Survey Results for the Province of Cabo Delgado

No.	District	Estimated Time Period of Change (Interpreted from LANDSAT)					Current Land-cover/Land-use Type
		-02	02-05	05-08	08-10	10-13	
WP02	Palma		○				Field Crops
WP08	Palma		○				Thicket
WP10	Palma		○				Thicket
WP11	Palma					○	Field Crops
WP14	Palma		○				Thicket
WP15	Palma			○			Thicket
WP18	Palma		○				Thicket
WP19	Palma		○				Field Crops
WP26	Mocímboa da Praia			○			Thicket

No.	District	Estimated Time Period of Change (Interpreted from LANDSAT)					Current Land-cover/Land-use Type
		-02	02-05	05-08	08-10	10-13	
WP48	Palma					○	Field Crops
WP36	Ancuabe			○			Field Crops
WP37	Ancuabe		○				Field Crops
WP38	Ancuabe			○			Thicket
WP39	Ancuabe				○		Thicket
WP42	Ancuabe				○		Field Crops
WP50	Ancuabe	○					Thicket
WP52	Ancuabe					○	Field Crops

As a result of the interpretation of satellite imagery, interviews to local people, and the initial field surveys, the following change patterns were commonly found in these two provinces (Table 3). In this table, GZ indicates the Province of Gaza, while CD indicates the Province of Cabo Delgado.

Table 3: Common Change Patterns in the Provinces of Gaza and Cabo Delgado

Province		Before Change	After Change	Local Conditions
GZ	CD			
○		Mopane Forest	Mopane Forest (Open)	Mopane forests that were cut due to charcoal production were found. In some places, trees with a large DBH were selectively cut, and trees with a small timber volume were not cut and left in place.
○		Mopane Forest	Field Crops	Areas where Mopane trees were completely cut and used for field crops were found. After trees were cut, the land was used for agriculture for a long time period. Regrowth of vegetation was not found.
○	○	Deciduous Forest	Field Crops	Trees were completely cut often because of fires, and the land was used for agriculture for a long time period. Regrowth of vegetation was not found.
	○	Field Crops	Thicket	After trees were completely cut and then the land was used for agriculture for about 3 to 5 years, the land was abandoned and currently dominated by thicket. For example, an area where a change from forest to field crops occurred between 2002 and 2005 was currently approximately 5-meter thicket.

Figure 7 shows satellite imagery and photos before and after the changes commonly found in the Provinces of Gaza and Cabo Delgado as described in Table 3. In this figure, GZ indicates the Province of Gaza, while CD indicates the Province of Cabo Delgado.

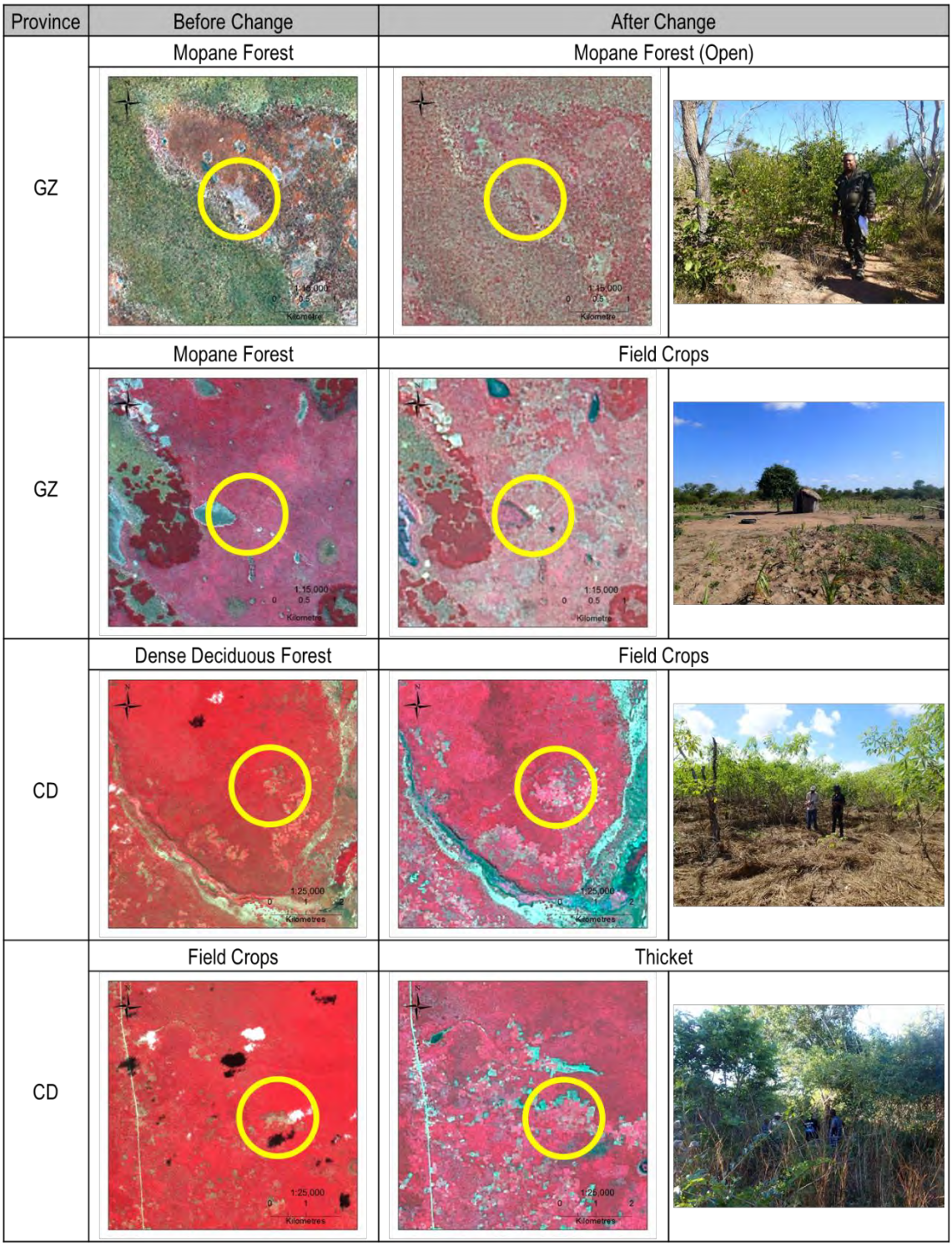

Figure 7: Satellite Imagery and Photos of Common Change Patterns in the Provinces of Gaza and Cabo Delgado

(4) Examination of Analysis Flows based on the Initial Field Surveys

The development of reference year maps requires the classification of change area polygons into

multiple classes by change patterns. To efficiently classify change area polygons by change patterns, the order of priority was examined based on the results of the initial field surveys. Specifically, changes from forests, including evergreen forest, deciduous forest, and Mopane forest, to field crops were often found during the initial field surveys. These change patterns were also identified on satellite imagery, and their possibility to be classified was confirmed. These change patterns were classified with the highest priority, as indicated by red squares (Figure 8).

			End														
			11 Semi-evergreen Forest (Dense)	12 Semi-evergreen Forest (Open)	13 Mecrusse Forest	14 Mangrove Forest	21 Semi-deciduous Forest (Dense)	22 Semi-deciduous Forest (Open)	23 Mopane Forest	33 Thicket	35 Grassland (inc. Shrubland)	36 Aquatic Grassland	37 Tree Crops	38 Field Crops	41 Bare Land	42 Villages	43 Water
Beginning	11	Semi-evergreen Forest (Dense)		○	×	×	×	×	×	△	○	×	○	○	×	○	×
	12	Semi-evergreen Forest (Open)	○		×	×	×	×	×	△	○	×	○	○	×	○	×
	13	Mecrusse Forest	×	×		×	×	×	×	△	○	×	△	○	×	○	×
	14	Mangrove Forest	×	×	×		×	×	×	×	×	×	×	×	×	×	△
	21	Semi-deciduous Forest (Dense)	×	×	×	×		○	△	△	○	×	○	○	×	○	×
	22	Semi-deciduous Forest (Open)	×	×	×	×	○		△	△	○	×	○	○	×	○	×
	23	Mopane Forest	×	×	×	×	△	△		△	○	×	○	○	×	○	×
	33	Thicket	×	△	×	×	×	△	×		×	×	○	○	×	○	×
	35	Grassland (inc. Shrubland)	×	○	×	×	×	○	○	△		○	○	○	×	○	○
	36	Aquatic Grassland	×	×	×	×	×	×	×	×	○		○	○	×	○	○
	37	Tree Crops	×	○	×	×	×	○	○	△	△	×		△	×	○	×
	38	Field Crops	×	×	×	×	×	×	×	△	△	△	△		×	○	×
	41	Bare Land	×	×	×	×	×	×	×	×	×	×	×	×		×	○
	42	Villages	×	×	×	×	×	×	×	×	△	×	△	△	×		×
	43	Water	×	×	×	△	×	×	×	×	○	○	×	×	○	×	

Figure 8: Change Patterns with the Highest Priority Specified based on the Initial Field Surveys

Appendix25 Results of Questionnaire Assessment on Implementation of Training on Radar Data Analysis

（1）Questionnaire Survey Results of Radar Data Analysis Training in 1st year

To check the participants' understanding of the training contents and get feedbacks useful for planning the second year training contents, questionnaire surveys were conducted after the first year training. The following shows the questionnaire survey results. Numbers at the upper row indicate the evaluation criteria, while the numbers at the lower row indicate the number of answers from the participants. The questionnaire survey results revealed that the training contents were mostly understood by the participants. The survey results also indicated that it was hard for the participants to become fully familiar with software of ArcGIS and ERDAS IMAGINE within the short time period. These points were addressed to improve training contents of the second project year. Figure 1 shows the first year radar data analysis training at the DNRI office.

【Questionnaire Survey Results】

1. Radar Imagery Data in General

1.1 Did you understand the principle of radar sensor observations?

Understood Not understand

5	4	3	2	1
5	1			

1.2 Did you understand unique features of radar satellite imagery data?

Understood Not understand

5	4	3	2	1
5	1			

1.3 Did you understand advantages and disadvantages of radar and optical satellite imagery data as well as their differences?

Understood Not understand

5	4	3	2	1
4	2			

1.4 Did you understand the potential utilization of radar imagery data? Did you also understand case studies of radar data analysis?

Understood Not understand

5	4	3	2	1
5	1			

2. Radar Data Analysis for Forest Areas

2.1 Did you understand that radar and optical imagery data appear differently?

Understood Not understand

5	4	3	2	1
5	1			

2.2 Did you understand forest changes/forest degradation detection using radar imagery data?

Understood Not understand

5	4	3	2	1
5	1			

2.3 Did you understand forest-cover change/forest degradation detection analysis using time series radar imagery data?

Understood Not understand

5	4	3	2	1
6				

2.4 Did you become familiar with the operation of ArcGIS?

Became familiar Not become familiar

5	4	3	2	1
1	1	1	3	

2.5 Did you become familiar with the operations of ERDAS IMAGINE?

Became familiar Not become familiar

5	4	3	2	1
1	2	3		

3. Training in General

3.1 The level of training contents

Easy Appropriate Difficult

5	4	3	2	1
3		3		

3.2 The length of training time/period

Short Appropriate Long

5	4	3	2	1
3		3		

3.3 The balance in volume between lectures/discussions and exercises

Good Bad

5	4	3	2	1
6				

Figure 1 Radar Data Analysis Training (The 1st Project Year)

(2) Questionnaire Survey Results of Radar Data Analysis Training in 2nd year

In the same manner, to check the participants' understanding of the training contents and get feedbacks

useful for planning future training contents, questionnaire surveys were conducted after the second year radar data analysis training. The following shows the questionnaire survey results. Numbers at the upper row indicate the evaluation criteria, while the numbers at the lower row indicate the number of answers from the participants. The questionnaire survey results revealed that the participants mostly understood the training contents. In the second project year, however, the degrees of understanding about radar data analysis were varied depending on the participants. This point will be addressed through on-the-job trainings of radar data analysis in the future. At the same time, many participants expressed that the larger amount of time for exercises would be needed in future trainings. In the third project year, two-week-long radar data analysis training is planned. Therefore, this point will be addressed by the third year training. Figure 2 shows the second year radar data analysis training at the DNRI office.

【Questionnaires' Results】

1. Radar Imagery in General

1.1 Did you understand the principle of radar sensor observations?

Well understood Not understand

5	4	3	2	1
2	1	2		

1.2 Did you understand unique features of radar satellite imagery data?

Well understood Not understand

5	4	3	2	1
1	3		1	

1.3 Did you understand advantages and disadvantages of radar and optical satellite imagery data as well as their differences?

Well understood Not understand

5	4	3	2	1
1	4			

1.4 Did you understand the potential of radar imagery data? Did you also understand case studies of radar data analysis?

Well understood Not understand

5	4	3	2	1
	3	1	1	

2. Radar Data Analysis for Forest Areas

2.1 Did you understand that radar and optical imagery data appear differently?

Well understood Not understand

5	4	3	2	1
1	4			

2.2 Did you understand forest-cover changes/forest degradation detection using radar imagery data?

Well understood Not understand

5	4	3	2	1
1	3		1	

2.3 Did you understand forest-covert change/forest degradation detection using time series radar imagery data?

Well understood — Not understand

5	4	3	2	1
2	2		1	

2.4 Did you improve the operations of ArcGIS?

Improved — Not improved

5	4	3	2	1
1	1	3		

2.5 Did you improve the operations of ERDAS IMAGINE?

Improved — Not improved

5	4	3	2	1
1	1	2	1	

3. Training in General

3.1 The level of training contents

Easy — Good — Difficult

5	4	3	2	1
		4	1	

3.2 The length of training time/period

Short — Good — Long

5	4	3	2	1
1		3	1	

3.3 The balance in volume between lectures/discussions and exercises

Good — Bad

5	4	3	2	1
4	1			

3.4 The training materials (inc. texts and digital data)

Easy — Good — Difficult

5	4	3	2	1
		4	1	

4.1 Please name the most beneficial subject(s) in the training.

・Geometric correction of radar imagery data
・Data conversions of radar imagery data
・Chenge detection using both radar and optical satellite imagery data
・Land-cover changes were easily indentified.
・Radar data analysis and detection of deforestation areas

4.2 Please write the subject that should be added to the future training.

・Lectures and exercises about the calculation of deforestation areas need to be included in the deforestation section if possible.
・Automatic classification and supervised classification for radar and optical satellite imagery data
・More exercises are needed.
・I would like to use radar and optical satellite imagery data in various ways using ArcGIS and ERDAS IMAGINE.

4.3 Please write the subject that should be eliminated from the future training.

・Nothing needs to be removed because every section is important.
・It is not necessary to remoce any section.
・All lectures and exercises were important.

4.4 Please write other opinions or questions about the training if applicable.

・I think that the training period should be longer because I have never used radar imagery data and need a large amount of time to become familiar with them. To continue the exercises, I hope that we would be able to obtain the data set of this training. Last but not least, thank you for the invitation to the training.
・I think we can make use of these experiences for the preparation of historical data for REL setting.
・I hope that future training(s) will intend for staff members of the provinces, districts, and administrative posts because they need to understand how to calculate the areas of deforestation and forest degradation sites. The outcomes need to be included in attribute tables. As a result, it is possible for the local staff members to easily identify deforestation areas.
・I hope that coffee and snacks will be served during break time.
・To improve my imagery data analysis skills and knowledge, I would like to experience more hands-on exercises with applications.

Figure 2: Radar Data Analysis Training (The 2nd Project Year)

(3) Questionnaire Survey Results of Radar Data Analysis Training in 3rd year

To check the participants' understanding of the training contents and get feedbacks useful for planning the fourth year training contents, questionnaire surveys were conducted after the third year training. The following shows the questionnaire survey results. Numbers at the upper row indicate the evaluation criteria, while the numbers at the lower row indicate the number of answers from the participants. The questionnaire survey results revealed that the training contents were mostly understood by the participants. The results implied that the participants had got accustomed to the handling of radar imagery and software of ArcMap and ERDAS Imagine as a result of the trainings over the last three years. The results also implied that the level of training contents and the length of training period were appropriate for the participants. The questionnaire at the end of the second year training indicated that the length of training period, especially for practical exercises, was too short for some participants to improve their operation skills. In the third year training, therefore, the length of training period was extended to two weeks, and because the C/P repeatedly worked with both lectures and exercises, the C/P could largely improve their understanding about imagery analysis. Similarly, by increasing the amount of time designated for practical exercises of radar imagery analysis, this further increased the level of their satisfaction. In the fourth project year, one-week-long training is scheduled. To improve their understanding about the training contents, it is desired to conduct not only the scheduled one-week-long training but also periodic reviews of radar imagery analysis.

【Questionnaire Survey Results】

1. Radar Imagery Analysis in General

1.1 Did you understand the principle of radar imagery analysis?

Well understood — Not understand

5	4	3	2	1
2	1			

1.2 Did you understand deforestation detection using radar imagery by visual interpretation?

Well understood — Not understand

5	4	3	2	1
1	2			

1.3 Did you understand advantages and disadvantages of Fine Beam mode (FBD) radar imagery and Scan SAR mode (WBD) radar imagery as well as their differences?

Well understood — Not understand

5	4	3	2	1
1	2			

1.4 Did you understand the potential of radar imagery for detecting deforestation?

Well understood — Not understand

5	4	3	2	1
1	2			

1.5 Did you understand the GBFM (Ground Based Forest Monitoring) survey results?

Well understood — Not understand

5	4	3	2	1
	3			

1.6 Did you understand how to calculate statistics of deforestation areas from radar imagery?

Well understood — Not understand

5	4	3	2	1
	2	1		

1.7 Did you understand the threshold values for automatic deforestation detection?

Well understood — Not understand

5	4	3	2	1
2		1		

1.8 Did you understand deforestation detection using radar imagery by automatic interpretation?

Well understood — Not understand

5	4	3	2	1
2	1			

1.9 Did you improve handling of radar satellite imagery?

Improved — Not improved

5	4	3	2	1
1	2			

1.10 Did you improve the operations of ArcGIS?

Improved — Not improved

5	4	3	2	1
1	2			

1.11 Did you improve the operations of ERDAS IMAGINE?

Improved — Not improved

5	4	3	2	1
1	2			

2. Training in General

2.1 The level of training contents

Easy		Good		Difficult
		3		

2.2 The length of training time/period

Short		Good		Long
		3		

2.3 The balance in volume between lectures/discussions and exercises

Good				Bad
3				

2.4 The training materials (inc. texts and digital data)

Easy		Good		Difficult
		3		

3.1 Please name the most beneficial subject(s) in the training.

- Statistical calculation of deforestation area. Conversion from raster to polygon data.
- Automatic detection of deforestation sites using threshold.
- Comparison of radar imagery of different years using decibel value (backscatter coefficient). Conversion of digital value to decibel value.

3.2 Please write the subject that should be added to the future training.

- Automatic detection of changes in optical imagery, if possible because optical images are available free of charge.
- Visual interpretation and automatic detection of deforestation sites using free imagery data such as LANDSAT.
- If possible, I would like to conduct verification in the field (ground truth) for the results of processed imagery.

3.3 Please write the subject that should be eliminated from the future training.

- As all are important, nothing should be deleted.
- None.

4 Please write other opinions or questions about the training if applicable.

- I learned that satellite imagery in high resolution mode has a high spatial resolution and that their range is limited to 70×70km. Considering the sustainability of the monitoring activities, I wondered if it is possible for us to purchase a set of expensive imagery to cover the whole area of Mozambique.
- I found this course very effective because I didn't know the method for identifying large scale deforestation areas and newly learnt this method in this course.

At the same time, Figure 3 shows the radar imagery analysis training held at the DNRI office.

Figure 3 Radar Imagery Analysis Training (The 3rd Project Year)

(4) Questionnaire Survey Results of Radar Data Analysis Training in 4th year

After the completion of training on radar image analysis for the fourth year, a questionnaire survey on the training participants' evaluation was conducted, with an aim at learning how far trainees understood the content and at examining the content of training in Japan to be offered in the fifth year. The results of the questionnaire survey are shown below. The number shown in the upper part of each table is the evaluation criteria and the one shown in the lower part is the number of responses obtained from trainees. Based on the survey result, it is considered that the content of training was generally understood by the trainees. Personnel at DIRF who were newly appointed in the fourth year also

participated in the training and therefore, one of such personnel recorded a basically low level of understanding, while with respect to other personnel, it can be said they understood most of the content. The training was conducted as appropriately as possible in terms of the level of content and time spent. In the training provided in the fourth year, understanding could be deepened as more time was spent on practical training on radar image analysis. In addition, during the training session, C/P developed work procedures for deforestation extraction on their own so that they could use the procedures even after the training ended. Through this training, C/P became able to extract deforested areas on their own from radar images taken at two different times, using automatic classification. Although it is not planned to offer training in the fifth year, it is desirable that follow-up sessions on radar image analysis could be offered in the form of OJT.

[Questionnaire Survey Results]

1. About radar image analysis

1.1 Do you understand the fundamental principles of radar image analysis?

Well understood — Not understand

5	4	3	2	1
1	3		1	

1.2 Can you extract deforestation using ArcGIS? (A simple radar image analysis using the threshold of -4.0dB)

Well done — Not done

5	4	3	2	1
3	1		1	

1.3 Did you understand the results of GBFM performed so far (field surveys based on the result of radar image analysis)?

Well understood — Not understand

5	4	3	2	1
2	2		1	

1.4 Did you understand the improvement made in the method of radar image analysis based on the results of GBFM field surveys? (Thresholds shown in blue, green and red)

Well understood — Not understand

5	4	3	2	1
2	2		1	

1.5 Can you extract deforestation using the improved method of radar image analysis and the Model Maker of ERDAS IMAGINE?

Well done — Not done

5	4	3	2	1
4		1		

1.6 Were you able to validate the deforested areas that were extracted using the improved method?

Well done — Not done

5	4	3	2	1
3		2		

1.7 Were you able to review the results obtained through an analysis of radar images of a higher spatial resolution (resolution of 6.25 m) and a lower spatial resolution of 25 m?

Well done Not done

5	4	3	2	1
3	1		1	

1.8 Can you extract deforested areas from the entire province using obscured radar images of the entire province?

Well done Not done

5	4	3	2	1
3	1		1	

1.9 Did you understand how to conduct waterbodies masking to eliminate misclassification?

Well understood Not understand

5	4	3	2	1
2		2	1	

1.10 Were you able to integrate the practical training you had into a manual?

Well done Not done

5	4	3	2	1
1	3	1		

2. Training in General

2.1 The level of training contents

Easy		Good		Difficult
1		4		

2.2 The length of training time/period

Short		Good		Long
2		3		

2.3 The balance in volume between lectures/discussions and exercises

Good				Bad
3	1	1		

2.4 The training materials (inc. texts and digital data)

Easy		Good		Difficult
1		4		

3.1 Please name the most beneficial subject(s) in the training.

- Model Maker that can be used in actual operation was effective.
- All of the training contents were effective.
- Processing of the value from DN to dB
- Analysis using Model Maker to set up lines of deforestation
- Fundamental concept of radar image analysis
- Radar image analysis based on the results of GBFM
- Identification of deforested areas using Model Maker of ERDAS IMAGINE
- Identification of deforested areas on a wider provincial level using obscured radar images

3.2 Please write the subject that should be added to the future training.

- How do you utilize what you learned through the training in the issue of forest degradation?
- Since I am a beginner, I need to take more time to learn all of the training contents.
- Since the best training content was watershed masking for different occasions, I want to study the subject more extensively and learn how to eliminate misclassification in the masked areas.

・Elimination of misclassification through masking
・To spend a whole day on analysis of GBFM results
・Identification of deforested areas through Model Maker of ERDAS IMAGINE

3.3 Please write the subject that should be eliminated from the future training.

・None (more than one trainee)
・Analysis using a simple model to use the threshold of -4.0 dB

4 Please write other opinions or questions about the training if applicable.

・I hope that detailed manuals on advanced technologies will be developed, if possible.
・How can I remove misclassification of masked areas after conducting watershed masking?
・Looking into the future, I want to develop a method to identify deforested areas in the remaining provinces where processing is yet to be made.
・I think the threshold shown in blue line was most suitable to identify deforested areas.

At the same time, Figure 4 shows the radar imagery analysis training held at the DIRF office.

Figure 4 Radar Imagery Analysis Training (The 4th Project Year)

Appendix26 Results of supervision work of forest inventory by subcontract work in Gaza and Cabo Delgado provinces

(1) Supervision of local subcontractor work in Gaza Province

The subcontractor Traforest started the inventory survey in Gaza Province in July, 2015. Along with this, the project team carried out the supervision of subcontractor work as follows.
In addition, the following supervision is of the only period during which Japanese experts participated. From the July 15, to the beginning of August 2015, only the staff of DNRI and SPFFB-Gaza carried out the supervision work without being accompanied by Japanese experts.

1) 1st supervision work

<table>
<tr><td>Period</td><td>9-14 of July 2015</td></tr>
<tr><td>Supervisor</td><td>Kato, Kajigaki, Fukuchi, Renato (DNRI) and Beca (SPFFB Gaza)</td></tr>
<tr><td>Survey point (Cluster ID)</td><td>Xai-xai, Chokwe, Massingir (GZ028379), Limpopo National Park (GZ011646)</td></tr>
<tr><td>Contents</td><td>Prior to the start of the inventory survey by the subcontractor, details of survey were explained and a request for dispatching the supervisors was submitted to the SPFFB-Gaza in Xai-xai. In addition, details of the survey were explained and a request for safety cooperation in particular was submitted to the Limpopo National Park Office in Massingir. The facility of a house which was rented as the base of inventory survey by the subcontractor in Chokwe was examined. Some of the Priority clusters expected to be difficult to access based on Google Earth were changed to the Supplementary clusters (see below) and these changes were informed to the subcontractor because predators inhabiting the Limpopo National Park can be harmful to the survey in the field.
<table>
<tr><th>Forest type</th><th>Planned cluster</th><th>Modified cluster</th><th>Note</th></tr>
<tr><td>Mecrusse forest</td><td>GZ001071</td><td>GZ016139</td><td rowspan="2">Modified to outside of National park</td></tr>
<tr><td>Mecrusse forest</td><td>GZ001671</td><td>GZ015248</td></tr>
<tr><td>Open deciduous forest</td><td>GZ012861</td><td>GZ006548</td><td></td></tr>
<tr><td>Open deciduous forest</td><td>GZ018103</td><td>GZ019063</td><td></td></tr>
</table>
The subcontractor was planning to implement the inventory survey by forming three teams. However, initially these three teams conducted a survey together in the same cluster to confirm survey methods to be aplied. In Massingir, the survey was carried out at the cluster (GZ028379) which was classified as Mopane forests in the forest cover map. It was expected that some plots did not meet the conditions to be defined as forests. Even in such plots, it was instructed to conduct the survey of the standing trees that meet the conditions of standing trees to be measured. It was instructed to carry out the correction due to the magnetic declination in the rectangular plot setting. In the Limpopo National Park, the survey was conducted at the cluster (GZ011646) which was classified as Mopane forests in the forest cover map.
It was instructed to install the numbering tags on the measured trees and paint the landmark, metal stake and the measured trees in the national park.</td></tr>
<tr><td>Evaluation</td><td>No problem was seen to reach the plots by GPS because they reached the points within 3m from the destination points as the GPS screen displayed. However, it did not appear to be sufficient about the recording of GPS tracks. It was felt the subcontractor conducted the survey with sincere attitude. There is no difficulty in the tree height measurement because the height of measured trees was low enough</td></tr>
</table>

	to measure by a height measurement pole. The survey was conduct at a pace of 1 cluster per day because the survey started late in a day and the survey proceeded, checking its contents. However, it was expected work efficiency will improve along with their proficiency of the work getting achieved in the future.

2) 2nd supervision work

Period	4 and 6 of August 2015
Supervisor	Kato
Survey point and forest type (Cluster ID)	Mapai in Chicualacuala District: Mecrusse forest（GZ015248） Combomune in Mabalane District: Mopane forest *It was open evergreen forest in the forest cover map
Evaluation	No serious mistakes were found on the plot access, plot setting or tree measurement. However, there was a difficulty to identify whether the trees standing close to the boundary of the plot were inside or outside of the plot due to poor field vision.

3) 3rd supervision work

Period	2 and 3 of September 2015
Supervisor	Toyoda
Survey point and forest type (Cluster ID)	Chigubo in Chigubo District: Mopane forest (GZ034209, GZ037277)
Evaluation	No serious mistakes were found on the plot access, plot setting or tree measurement. In addition, it is recommended to put an indicative rope to clarify the boundary for setting a plot. However, the subcontractor didn't put the indicative rope because there was no understory vegetation in Mopane forests and a field of vision was clear. This treatment was no problem from the technical aspect and it can be said that the subcontractor took an efficient method. With regard to an operational aspect, it was found that they were getting tired after spending many days in the survey and tent camping. Moreover, it was found that damage to the vehicle was severe for driving it on unpaved roads to access the plots.

(2) Supervision of subcontract work

The subcontractor Traforest started the inventory survey in Cabo Delgado Province in May 2016 and completed field survey in November 2016. The project team carried out the supervision of the work by subcontractor as follows.

1) The 1st supervision work in the 4th year

Period	From 23rd May 2016 to 15th June 2016
Supervisor	Kajigaki (JICA project team), Isaac (DFRI), Marcio (SPFFB of Cabo Delgado Province)
Survey point, forest type and cluster ID	Mueda: Deciduous forest (CD038862, CD039184, CD045347) Palma: Deciduous forest (CD070697), evergreen forest (CD064763, CD061158)
Contents and evaluation	JICA project team gave advance explanation to SPFFB of Cabo Delgado Province at Pemba prior to the starting of an inventory by a subcontractor. JICA project team requested SPFFB to participate in the supervision work and was accepted. A staff of SPFFB took part in the supervision work for 5 days in Mueda when the inventory started. JICA project team also gave advance explanation to the Qurimbas national park office, requested the office to dispatch a ranger taking into the consideration of safety, and was accepted. At first, Traforest put a base in Mueda and implemented survey in the surrounding clusters by 3-4 survey teams. However, Traforest divided the teams into 2 groups (One group consists of 2 teams.) to survey in Mute located in north-eastern area of the province and Nairoto located in central area of the province respectively in order to give priority to implement survey in clusters with being efficient work when Traforest met several clusters with difficult accessibility. JICA project team instructed Traforest how to take 360° image photo as Traforest was not used to using the camera. JICA project team explained how to measure horizontal distance to Traforest as the way of plot setting on the slope by Traforest was not always correct.  Field survey in deciduous forest of Miombo (CD039184)

2) The 2nd supervision work in the 4th year

Period	From 19th July 2016 to 29th July 2016
Supervisor	Toyoda, Shimaoka, Isaac (DFRI), Diomba (SPFFB)
Survey point, forest type and cluster ID	Meluco：Deciduous forest（CD046349、CD036533、CD044796） Muaguide：Deciduous forest（CD057709） Mecufi：Mangrove forest（CD077426）
Contents and evaluation	No serious mistakes were found on the plot access, the plot setting, or the measurement of trees. Because Quirimbas National Park was designated as a permanent plot, JICA project team coached to Traforest how to attach aluminum tags to measured trees. For the mangrove survey from the end of August, field survey including a training about Mangrove survey method was conducted for one team including Mr. Bunster who is CEO of Traforest. Miombo forest has a lot of trees in 5 meters or less in height and the field of view is open. Traforest utilizes the T-shaped wood that prepared in advance when drawing the center line from the starting point of the plot, for the angle of 90 degrees of the plot is efficiently produced. Although it is a method that cannot be used in large plot because of occurring big errors, but in this survey, it can be evaluated in order to make rectangular plots efficiently. It was realized that selection of permanent plot was difficult because it was seen that someone had been felling trees, clearing land for cultivation and conducting slash and burn cultivation near the clusters in Quirimbas National Park.  A temporary stake and a T-shaped ruler for plot setting

3) The 3rd supervision work in the 4th year

Period	From 27August to 6 September 2016
Supervisor	Shimaoka, Isaac (DFRI), Diomba (SPFFB)
Survey point, forest type and cluster ID	Quissanga：Mangrove forest（CD077456） Ibo：Mangrove forest（CD077760、CD077716） Quissanga：Mangrove forest（CD077548）
Contents and evaluation	Traforest, a subcontractor, had little experience on mangrove survey and needed to instruct survey methods during supervision work. In the first survey conducted in Quissanga, three teams conducted a survey of one plot, and the next day examined the remaining three plots to establish the knowledge and techniques. In supervision work, JICA project team provided Traforest with technical guidance on methods such as formulation of circular plots using rope and flags, tree species identification, arrival at the survey target site and utilization of tidal data. Plot access in the mangrove inventory in most cases, they used a ship because they could not reach the nearest point by car. Depending on the location, even though the survey team try to access to a cluster by use of ship, there was also a place to walk more than 1 km in the bad footing after getting off the ship, sometimes it took 1 hour to go 300 m when initially they were not used to working. Traforest devised survey method such as using a rope whose length was adjusted beforehand to identify whether or not trees near the boundary were within the survey range, because chest was submerged in sea water sometimes before arriving at the plot, so it was not possible to bring the vertex. In addition, although the measuring stick being used was sometimes unusable because of sand and mud when accessing to the plot, it is dealt with by making a simple measuring stick by the branch of the 2 m tree in the vicinity of measured trees. Before the survey, the project team gave a prior explanation and greetings to Quissanga, Ibo Island, Mocimboa da Praia, and SDAE of Parma. When accessing to the plot using GPS, Traforest often moved on the roots and in the roots of mangrove. Visibility was so low that the project team and Traforest could not see 1 m ahead on the site where *Ceriops tagal* was growing relatively thick and was dense. Then there was also a time lag in acquiring GPS information and there were many difficult scenes.  Prop roots of *Rhizophora mucronata* (on the way to CD077456)

Appendix28 Results of questionnaire assessment on implementation of basic training on the forest inventory

The questionnaire was distributed to the participants after the training to evaluate the forest inventory training. According to the answers to the questionnaire by the participants, it can be considered that the training achieved its objective on trainees' acquiring the technique and knowledge for the implementation of forest inventory using the measuring instruments. However, under stress of bad weather, it did not seem that training had enough time for the measuring instruments and field training. The participants' answers to the questionnaire are summarized below.

[Evaluation of training in the 1st year]

Course Evaluation Questionnaire (Results)

Date filled out： October 25,2013

Participant's number: 13

Course duration: October 16-25, 2013 (10 days)

1. The training objective is "Getting the technique and knowledge for implementation of the forest inventory using the equipment." Did you achieve the objective?

Not Achieved Totally achieved

1	2	3	4	5
		1	7	5

Note) Upper column: grade of evaluation

Lower column: number of respondents

2. Had you any difficulties to understand the content of training? If yes, which contents were difficult?

No difficulties (Maputo, Manica, Zambezia, Niassa, DNTF-Sande, UEM), Lack of time to exercise with equipment (Maputo, Gaza, Sofala, Manica), More time needed to exercise PDA & Yuma (Inhambane), There were some teaching materials not distributed and lack of practice about Nomad (Tete), Remote Sensing (Nampula), Language, because interpretation does not reach the same as the instructor wants to say (C.Delgado), Too much instruments to learn in such a short time (DNTF-Isaac)

3. Which kind of lecture or practice is necessary to improve your technique and knowledge?

Exercise in a dense forest or Mozambican real forest or in a permanent plot to know the limitations of equipment in such environment (Maputo, Zambezia, Nampula), More field practice needed (Gaza, DNTF-Sande), Another TruPulse & Vertex training (Inhambane), More time needed to exercise Nomad & Yuma (Sofala), Overall inventory process oriented by instructors since planning, field survey, data processing and feedback (Tete), GIS-GPS, Yuma & Nomad (Nampula), Nomad usage (Niassa), Almost of every subject needed more time (C.Delgado), Calculation exercise with excel (DNTF-Sande)

4. What is your evaluation of the general administration and management of the training program?

Very weak Weak Normal Good Very Good

1	2	3	4	5
		4	6	3

5. What is your evaluation of the facilities of lecture?

Very weak Weak Normal Good Very Good

1	2	3	4	5
		1	6	6

6. How do you think of the number of trainees?

Very few Few Normal Crowded Very crowded

1	2	3	4	5
		10		3

7. How do you think of the duration of the training?

Very short	Short	Normal	Long	Too long
1	2	3	4	5
	5	7	1	

8. If you answered 1 or 2 to the questions 4 to 7, explain what was not appropriate and what can we do to improve?

Longer duration to let everybody capable to have more contact with equipment (Maputo), Practice in a forest that would reflect country's condition (Maputo), Training in a rainy season is not favorable to field work with equipment (Maputo), More practice (Inhambane, Nampula, Niassa, DNTF-Isaac), In hotel, 2 persons staying per room must be reviewed because it is a matter of privacy (Niassa).

9. Other comments:

Hotel in Maputo not good, water leakage from roof when the upstairs' room is taking a shower (Gaza), I feel that the value added to environment related to deforestation is getting higher. REDD+ will potentialize the love to vegetation cover and elevate community and humanity perception. It was a very interesting course because I am studying environment control & community development in university. Thank you (Sofala), It was a good course, but the acquired knowledge will have better impact if we were able to take the trained equipment with us to each province, since that it could take time to wait for the all donated package come with all bureaucracy procedures, and also, these trained equipment should not come to our hands and end in another place. So, the equipment should be handled with a TOR letter to specify the responsibilities of who/where/how/with what objective it must be used. (Tete), Thank you for the moderators that did everything to make the participants understand the matter (DNTF-Sande).

[Evaluation of training in the 2nd year]

Course Evaluation Questionnaire (Results)

Date filled out： July 4, 2014

Participant's number: 11

Course duration: June 19- July 4, 2014 (16days)

1. The training objective is "Getting the technique and knowledge for implementation of the forest inventory using the equipment." Did you achieve the objective?

Not Achieved				Totally achieved
1	2	3	4	5
			9	2

Note) Upper column: grade of evaluation

Lower column: number of respondents

2. Had you any difficulties to understand the content of training?

Time was lacking to be use to equipment. Quantity of equipment was too many in comparison with training time.

3. Which kind of lecture or practice is necessary to improve your technique and knowledge?

More days for training. Lecture for carbon stock estimation. Map display by electronic equipment and usage of Google Earth. Data analysis about biomass. Regular exercise with equipment. Exercise in closed forest, real forest in Mozambique or permanent plot to know the limit of equipment. Overall inventory process oriented by

instructors since planning, field survey, data processing and feedback. Usage of GIS, GPS, YUMA (tablet PC) and NOMAD (PDA). Exercise of calculation using EXCEL.

4. What is your evaluation of the general administration and management of the training program?

Very weak	Weak	Normal	Good	Very Good
1	2	3	4	5
			7	4

5. What is your evaluation of the facilities of lecture?

Very weak	Weak	Normal	Good	Very Good
1	2	3	4	5
			7	4

6. How do you think of the number of trainees?

Very few	Few	Normal	crowded	Very crowded
1	2	3	4	5
		7	1	3

7. How do you think of the duration of the training?

Very short	Short	Normal	Long	Too long
1	2	3	4	5
	1	10		

8. If you answered 1 or 2 to the questions 4 to 7, explain what was not appropriate and what can we do to improve?

The training should be held in the period without public holidays. Some provinces have not received equipment yet. Training period should be longer as trainees can have more opportunities to use equipment. Practice in a forest that would reflect country's condition. More practice.

9. Other comments:

The challenges we had through the training will be an experience to transmit in our provinces. It was a good course, but the acquired knowledge could have problems with some bureaucracy and DNTF should be sensitized for the technicians to make the bureaucracy much easier. More time must be there for the practice to overpass all the problem on the equipment use. Thank JICA for the training. The training helped us to improve our experience about the forest survey, analysis and the exercise of the equipment.

Appendix 29 Results of ground-based-forest-monitoring

Table 1 GBFM survey result in Cabo Delgado on June

Survey point	Past forest type		Deforestation			Area		General conditions around survey point	Remaining Crown cover rate (%) [1]	GPS	
	LC type on ALOS 2008	Assumed Forest Type, Height and Crown Cover Rate from surrounding condition	Yes/ No	Timing	Cause	Area before survey (ha)	Area from survey (ha)			Latitude	Longitude
CD002	Tree crop	Deciduous, Less than 3m, Intermediate	No	N/A	-	3.83	-	Not confirmed deforestation in this area by villagers.	N/A	-13.1428440	40.243352
CD003	Deciduous (Not include Miombo)(Dense)	Deciduous, Less than 10m,Dense	Yes	N/A	S&B	1.28	-	There is remaining small tree	N/A	-13.1338680	40.129517
CD004	Tree crop	Deciduous, Less than15m, Intermediate	Yes	N/A	S&B	1.3	-	More remaining tree than CD003	N/A	-13.1346530	40.126789
-	Deciduous(Not include Miombo)(Dense)	Miombo, Less than10m,Dense	Yes	March ~ April 2015	S&B	-	0.34	-	N/A	-13.1360810	40.125787
CD005	Deciduous(Not include Miombo)(Dense)	Deciduous, Less than10m,Dense	Yes	September 2014	S&B	4.93	1.29	Felled tree will be used for charcoal	N/A	-13.1409450	40.092027
CD0013	Deciduous(Not include Miombo)(Open)	Deciduous, Less than15m,Dense	Yes	June ~ October 2014	S&B	0.78	0.34	S&B area was expanded year by year	N/A	-12.9723360	39.685239
CD029	Deciduous(Not include Miombo)(Open)	Deciduous, Less than 10m,Dense	Yes	August~ October 2014	S&B	0.68	0.69	-	N/A	-12.9009160	38.980676
-	Agriculture	Miombo, Less than 10m, Intermediate	Yes	December 2014	S&B	-	0.52	-	N/A	-12.8960660	38.995572
CD116	Tree crop	Miombo, Less than 15m,Dense	Yes	March ~ April 2014	-	0.25	-	Deforestation period is assumed.	N/A	-12.8899910	39.128198
CD097	Tree crop	-	Yes	N/A	-	1.94	-	Abandoned farmland	N/A	-13.0541240	39.219542

-	Deciduous(Include Miombo)	Deciduous, Less than 10m,Dense	No	N/A	-	-	0.14	There is a forest degradation in surrounding area due to charcoal production	40%	-13.0410260	39.226564
CD057	Deciduous(Not include Miombo)(Dense)	Deciduous, Less than15m,Dense	Yes	September ~ October 2014	S&B	0.32	0.44	Located high land	N/A	N/A	N/A
CD009	Deciduous(Not include Miombo)(Open)	-	Yes	Crop land since 2013	-	0.06	-	Confirmed abandoned farmland	N/A	-13.2176060	39.860839
-	Deciduous(Not include Miombo)(Open)	Deciduous, Less than10m,Open	Yes	September 2014	S&B	-	0.48		N/A	-13.2185100	39.861277
-	Deciduous(Not include Miombo)(Open)	Deciduous, Less than10m,Open	Yes	February 2015	Charcoal	-	0.01		N/A	-13.2183580	39.860949
-	Deciduous(Not include Miombo)(Open)	Acacia, Less than10m,Open	Yes	April ~ May 2015	Charcoal	-	0.07		N/A	-13.2180450	39.862218
CD008	Deciduous(Not include Miombo)(Open)	Deciduous, Less than15m,Open	Yes	2, 3 years ago	-	0.75	-	Corn field	N/A	-13.1121740	40.002939
-	Deciduous(Not include Miombo)(Open)	-	Yes	N/A	Mining	-	-		N/A	N/A	N/A

※[1] Remaining crown cover rate was not survey item in this time

Table 2 GBFM survey result in Cabo Delgado in August

Survey point	Past forest type		Deforestation			Area			Remaining Crown cover (%) [1]	GPS	
	LC type on ALOS 2008	Assumed forest type from surrounding condition, Height and Crown cover	Yes/ No	Timing	Cause	Area before survey (ha)	Area from survey (ha)	Comments		Latitude	Longitude
CD001	Open Deciduous	Deciduous, 15m, 50%	Yes	In 2015	S&B	4.03	-	Big trees still remaining. New deforestation is going outside polygon.	N/A	-12°57′45.7″	39°58′20.7″
CD002	Open Deciduous	Deciduous, 15m, 50%	Yes	Since October 2014	S&B	1.91	-	Some degradation areas can be seen. Charcoal Production also can be seen.	N/A	-12°53′31.6″	39°55′27.3″
CD003	Open Deciduous	Deciduous, 10m, 50%	Yes	Since October 2014	S&B	0.73	1.307	Cassava, Beans and Maize are planted.	N/A	-13°08′27.6″	39°50′21.4″
CD004	Dense Deciduous	Miombo, 15m, Dense	Yes	Since October 2014	S&B, Charcoal	0.42	-	Cotton area (expanding around here) for Montepuez and Balama.	N/A	-12°58′22.1″	38°57′43.8″
CD005	Dense Deciduous	Miombo, 15m, 50%	Yes	Since October 2014	S&B	0.57	0.483	Cassava, Beans, Maize and Sorghum are planted.	N/A	-12°57′03.6″	38°58′49.5″
CD006	Dense Deciduous	Miombo, 20m, Dense	Yes	Since October 2014	S&B	0.64	0.868	Sesame, Cassava, Beans, Maize and Sorghum are planted.	N/A	-12°53′51.0″	38°59′19.4″
CD007	Dense and Open Deciduous	Miombo, 15m, Dense	Yes	October 2014	S&B	3.78	-	2 farmers developed this field for charcoal production. Maize, cassava, ground nuts, sorghum and beans are planted.	N/A	-12°57′57.1″	39°01′47.9″
CD008	Open Deciduous	Thicket, 5m, Dense	No	December 2014	Development	4.49	-	Large area for development. This area was thicket last year.	N/A	-13°06′39.5″	39°03′21.2″
CD009	Open Deciduous	Thicket, 5m, Dense	No	—	S&B	1.38	-	Sesame is planted. Second shifting cultivation.	N/A	-13°05′17.4″	39°07′54.4″
CD010	Dense Deciduous	Miombo, 10m, Open	Yes	December 2014	S&B	1.04	1.337	Secondary Miombo Forest area. Cassava, Maize and Beans are planted.	N/A	-13°02′41.1″	39°15′00.8″
CD011	Open Deciduous	Deciduous, 15m, Open	No	—	—	0.73	-	Sesame and Maize are planted.	N/A	-13°00′30.4″	39°18′43.1″
CD012	Dense and Open Deciduous	Miombo, 20m, 50%	Yes	December 2014	S&B	0.97	0.318	Ground Nuts (Peanuts) under the ground. Maize, Sesame and Cassava are planted.	N/A	-12°52′49.5″	39°29′34.7″

CD013	Thicket and Dense Deciduous	Deciduous, 15m, Open	Yes	—	Commercial Agriculture	2.79	-	Commercial Cotton field. Former secondary deciduous forest.	N/A	-12°54′13.7″	39°30′22.6″
CD014	Field Crops	Deciduous, 10m, Dense	Yes	December 2014	S&B	0.9	1.165	Charcoal production. Cassava, Maize, Beans and Sorghum are planted. Former regrowth (secondary) deciduous forest.	N/A	-13°08′35.3″	39°52′37.6″

※[1]Remaining crown cover rate was not survey item in this time

Table 3 GBFM survey result in Zambezia in September

Survey point	Past forest type		Deforestation			Area			Remaining Crown cover (%) [1]	GPS	
	LC type on ALOS 2008	Assumed forest type from surrounding condition, Height and Crown cover	Yes/ No	Timing	Cause	Area before survey (ha)	Area from survey (ha)	Comments		Latitude	Longitude
ZB001	—	Deciduous, 10m, Open	Yes	In 2014	S&B	0.89	0.40	Maize, Sorghum and Mapira are planted. Some trees are remaining.	N/A	-17°22′13.7″	35°23′26.5″
ZB002	—	Deciduous, 15m, 50%	Yes	Since July 2014	S&B	2.57	1.73	Just only Slush and Burned. Partly ranch for cow. Sesame is only planted.	N/A	-17°11′08.1″	35°22′56.1″
ZB003	—	Deciduous, 10m, Open	Yes	In 2014	S&B	2.73	0.90	Cassava and Maize are planted. Some remaining stems are affected.	N/A	-17°02′09.3″	35°22′10.9″
ZB004	—	Miombo, 15m, 50%	Yes	December 2014	S&B	4.99	0.91	Mainly Maize is planted.	N/A	-17°14′03.6″	35°47′11.2″
ZB005	—	Deciduous, 10m, Open	Yes	December 2014	S&B	1.17	0.18	Sesame and Maize are planted. Some cut trees are remaining on the field.	N/A	-17°07′71.5″	35°47′79.0″
ZB006	—	Miombo, 15m, Dense	Yes	Oct. to Nov. in 2014	S&B	3.29	0.64	Field crop for Sesame. Some trees can be seen.	N/A	-16°57′59.7″	35°43′25.4″
ZB007	—	Miombo, 15m, Dense	Yes	July to Sep. in 2014	S&B	5.57	-	Huge deforestation area for Sesame.	N/A	-16°52′47.3″	35°49′11.2″
ZB008	—	Miombo, 15m, Dense	Yes	In 2014	S&B	1.41	1.01	S&B for Sesame. Former original Miombo (dense natural forest).	N/A	-16°52′59.3″	35°37′55.0″
ZB009	—	Deciduous, 15m, Dense	Yes	In 2014	S&B	1.88	0.68	Field crop for Sesame.	N/A	-16°48′40.1″	35°31′26.7″
ZB010	—	Semi-Evergreen, 20m, Dense	Yes	May to Oct. in 2014	S&B	4.24	-	New field crop for only Maize. Riverside forest (Semi-Evergreen). Some big trees can be seen.	N/A	-16°51′49.9″	35°25′35.0″
ZB011	—	Deciduous, 20m, 50%	No	July to Sep. in 2014	S&B	1.99	0.68	Degradation area. Sesame, Maize and Beans are planted.	N/A	-16°50′56.0″	35°25′36.8″

※[1]Remaining crown cover rate was not survey item in this time

Table 4 GBFM survey result in Gaza in October

Survey point	Past forest type		Deforestation			Area		General conditions around survey point	Remaining Crown cover rate (%)	GPS	
	LC type on ALOS 2008	Assumed Forest Type, Height and Crown Cover Rate from surrounding condition	Yes/No	Timing	Cause	Area before survey (ha)	Area from survey (ha)			Latitude	Longitude
GZ021	Deciduous (Dense)	Deciduous、5m、60%	N/A	last year	S&B (slash-and-burn)	1.26		The place where slash-and-burn was carried out for the first time from last year to this year	-	-24°19′187″	33°14′722″
GZ017	Deciduous (Open)	Deciduous、5-10m、40%	Yes	Several years ago	S&B	-		The cultivated land that has been already cultivated successively for several years	-	-24°22′632″	33°12′851″
GZ017Kawaay	Deciduous (Open)	Deciduous、5-10m、80%	No	N/A	weeding ?	0.72		The place where land is submerged under water in wet season, and a state of the swamp is kept for a while after wet season	0	-24°22′608″	33°12′816″
GZ035	Deciduous (Open)	Deciduous、less than 5m、80%	Yes	Jan and Feb 2014	S&B			The larger cultivated land is confirmed. Probably the part which spread later was more likely to be extracted this time	0	-24°18′885″	33°02′559″
GZ010	Deciduous (Open)	Deciduous、less than 5m、80%	Yes	2013	S&B	0.80		It was a forest land similar to the around. When cultivation was started, the all trees were cut other than fruit trees	5	-24°18′941″	33°02′765″
GZ011	Deciduous (Open)	Deciduous、less than 5m、80%	N/A	N/A	S&B	0.65		It is not clear the difference between the extracted part and the cultivated land in outside	1	-24°18′802″	33°02′878″
GZ009	Deciduous (Open)	Deciduous、less 5m、80%	Yes	Middle of 2014	S&B	1.91		The new slash-and-burn cultivated land. The trees were cut in the middle of last year. This year's cultivation is first time.	2	-24°19′185″	33°02′848″
GZ052	Deciduous (Open)	Deciduous、less than 15m、80%	Yes	July 2014	S&B	2.11	-	The preparation for cultivation (burn down) was started in July of this year. The seeding is planned from February to March in next year	0	-24°02′669″	33°15′906″

GZ051	Deciduous (Open)	Deciduous、5-10m、80%	N/A	N/A	S&B	1.05		The area that is not so wide is cleared and cultivated as the cultivated land. There is a warehouse that is under construction to store the crop in the midmost of the area	1	-24°02′549″	33°15′017″
GZ047	Mopane	Deciduous、less than 5m、80%	N/A	N/A	General cultivated land	0.93	-	The normal cultivated land that is not slash-and-burn cultivated land.	0	-24°09′546″	33°02′411″
GZ003	Mopane	Mopane、5-10m、80%	Yes	Several years ago	Charcoal making	0.28	-	The place that trees were felled for charcoal making several years before. It is estimated from the state of the stump, it is likely that several years pass from felling. Only a large diameter tree is felled	20	-24°10′728″	32°59′929″

Table 5 GBFM survey result in Gaza in November

Survey point	Past forest type		Deforestation			Area		General conditions around survey point	Remaining Crown cover rate (%)	GPS	
	LC type on ALOS 2008	Assumed Forest Type, Height and Crown Cover Rate from surrounding condition	Yes/ No	Timing	Cause	Area before survey (ha)	Area from survey (ha)			Latitude	Longitude
GZ050	Deciduous (Dense)	Deciduous, Less than 15m, 40～50%	Yes	N/A	S&B Cultivation	0.84	1.5293	New area of slush and burned cultivation united with non-forest area by the cultivation before September 2014. It was difficult to identify when the tree cutting was commenced but it was expected as newly developed area because of no mark of cultivation (just for preparation).	5	-24°02′49.1″	33°00′56.6″
GZ007	Deciduous (Dense)	Deciduous, Less than 15m, 50%	Yes	Beginning from Feb. 2015	S&B Cultivation and Charcoal making	1.05	3.7861	The Interviewee settled this site in January 2015. Clearing for slush and burned cultivation was conducted after the settlement and even after July this year.	2～3	-24°04′27.3″	33°01′42.6″
GZ001	Mopane	Deciduous, Less than 10m, 50～60%	Yes	N/A	S&B Cultivation	0.96	1.9127	Slush and burned cultivation site united with the cultivation area before September 2014 (boundary cannot be detected).	0	-24°10′27.3″	33°02′37.7″
GZ002	Deciduous (Open)	Deciduous, Less than 10m, 50～60%	Yes	July 2015	S&B Cultivation	2.28	2.3214	The detected area is an east-south part of large area of cultivation land (7～8ha）. The area was clearing in July this year according to the interview.	0	-24°11′35.5″	33°03′49.5″
GZ038	Deciduous (Open)	Mix with Deciduous and Mopane, Less than 10m, 30～40%	Yes	After July 2015?	S&B Cultivation	0.42	0.8804	It seemed that southern part of area is cultivation area after July this year, but boundary between it and cultivation area before July this year is not clear.	1～2	-24°15′40.0″	33°00′52.9″
GZ037	Deciduous (Open)	Deciduous, Less than 10m, 30%	Yes	Between July and Sep. 2015	S&B Cultivation	1.43	1.6444	According to an interview, cultivation was conducted from July 2015 after big trees were cut for fencing and charcoal making.	1	-24°18′11.8″	33°00′07.6″

GZ055	Deciduous (Open)	Thicket with Deciduous, Less than 5m, 70%	Yes	Between May and July 2015	S&B Cultivation	0.49	0.6495	Detected area as deforestation was part of slush and burned area with more than 5 ha, which is adjacent to non-forest area by slush and burned cultivation before September 2014.	0	-24°15′56.1″	33°07′53.9″
GZ045	Deciduous (Dense)	Deciduous, Less than 15m, 50%	Yes	N/A	S&B Cultivation	0.99	1.44	As far as checking the image, it seemed that preparation of cultivation was started by cutting some of trees before September 2014.	5	-24°14′46.0″	33°07′02.2″
GZ012	Deciduous (Open)	Deciduous, Less than 15m, 70%	Yes	Beginning from June 2015	S&B Cultivation and Charcoal making	0.51	1.5956	According to Interview with a owner, cutting trees for charcoal making from June this year and preparing slush and burned cultivation. Cutting trees were continued even after July in east and west sides.	5	-24°13′00.5″	33°07′26.9″
GZ046	Deciduous (Dense)	Deciduous, Less than 15m, 50%	Yes	Between May and June 2015	S&B Cultivation and Charcoal making	0.64	0.9487	It was expected that slush and burned cultivation was conducted after charcoal making by use of cut trees because there was a mark for charcoal making. Forest from northern boundary was fired, therefore, cultivation would be conducted next year after cutting trees next year.	1～2	-24°08′37.5″	33°09′17.0″

Table 6 GBFM survey result in Cabo Delgado in December

Survey point	Past forest type		Deforestation			Area			Remaining Crown cover (%) [1]	GPS	
	LC type on ALOS 2008	Assumed forest type from surrounding condition, Height and Crown cover	Yes/ No	Timing	Cause	Area before survey (ha)	Area from survey (ha)	Comments		Latitude	Longitude
CD-PA-20	Deciduous(Include Miombo)(Dense)	Wetland	No	-	-	1.7	-	Grass land(2～3m). It might be burnt before December. No water, though here is wetland	-	11°05'28.9"	40°19'30.5"
CD-PA-23	Deciduous(Include Miombo)(Open)	Evergreen, Less than10 m, Dense	Yes	June 2015	S&B	5.5	6.6	-	-	11°05'43.4"	40°09'22.5"
CD-PA-38	Deciduous(Include Miombo)(Dense)	Evergreen, Less than 10 m, Dense	Yes	May ~ June 2014	S&B	4.7	-	Tree cutting was conducted on May ~ June 2014 in North area and June 2015 in South area. It was put fire on October 2015.	-	10°54'51.0"	40°05'42.5"
CD-PA-37-1	Evergreen(Dense)	Evergreen, Less than 15 m, Dense	Yes	Three years ago	S&B	16.7	-	-	-	10°53' 20.1"	40°02'16.5'
CD-PA-37-2	Evergreen(Dense)	Evergreen, Less than 15 m, Dense	Yes	June ~ July 2015	S&B	-	0.02	-	5%	10°53'44,7"	40°02'18.7"
CD-M-21	Deciduous(Include Miombo)(Open)	Miombo, Less than 15 m, Dense	No	-	-	3.7	-	From the viewpoint of filed level, it may deforestation due to tree condition.	40%	11°10'04.1"	40°17'40.3"
CD-PA-18	Deciduous(Include Miombo)(Open)	Deciduous, Less than 20 m, Dense	Yes	August ~ October 2015	S&B	0.9	-	Confirmed deforestation in surrounding area.	-	11°10'36.6"	40°16'12.6"
CD-M-20	Deciduous(Include Miombo)(Dense)	Deciduous, Less than 20 m, Dense	Yes	July 2014(East side), August ~ September 2014(West side)	S&B	21.2	-	Put fire on November 2014	5%	11°10'20,1"	40°16'27,0"
CD-M-25	Deciduous(Include Miombo)(Dense)	Deciduous, Less than 20 m , Dense	Yes	September ~ October 2015	S&B	13.9	4.4	Put fire on November 2015	-	11°11'29.7"	40°14'47.3"
CD-M-42	Deciduous(Include Miombo)(Dense)	Deciduous, Less than 20 m, Intermediate	Yes	October 2014	S&B	2.9	2.9	Difficult to judge if deforestation or not	30%	11°12'44.9"	40°08'01.7"
CD-M-34	Evergreen(Dense)	Deciduous,以下,	Yes	2015	S&B	20.6	-	Confirmed deforestation only west side.	-	11°13'45,8"	40°03'26.1"
CD-M-37	Deciduous(Include Miombo)(Open)	Wetland	No	-	-	2.3	-	Grass land(2m) on wetland	-	11°29'34,2"	40°16'226,6"
CD-M-16-1	Deciduous(Include Miombo)(Open)	Evergreen, Less than 10 m, Dense	Yes	2014(Not sure)	S&B	3.9	0.5	It might be second year S&B because cassava is already planted.	5%	11°32'94.7"	40°14'49.1"

CD-M-16-2	Deciduous(Include Miombo)(Open)	Evergreen, Less than 15 m, Dense	Yes	October 2015	S&B	-	0.4	-	-	11°32'94,34"	40°14'444"
CD-M-16-3	Deciduous(Include Miombo)(Open)	Deciduous, Less than 15 m, Dense	Yes	2015	S&B	-	0.9	-	2-3%	11°33'00.67"	40°14'26.2"
CD-M-15	Deciduous(Include Miombo)(Open)	Deciduous, Less than 15 m, Dense	Yes	2015	S&B	2.1	2.4	-	-	11°32'43.2"	40°14'41.5"
CD-M-19	Deciduous(Include Miombo)(Open)	Deciduous, Less than 15 m, Dense	Yes	August ~ September 2015	S&B	2.5	2.8	It is very clear the broader of deforestation	5%	11°23'423"	40°10'712"
CD-M45-1	Deciduous(Include Miombo)(Open)	Deciduous, Less than 15 m, Dense	Yes	2015	S&B	5.7	0.6	-	3%	11°24'47.1"	40°08'45.3"
CD-M45-2	Deciduous(Include Miombo)(Open)	Deciduous, Less than 15 m, Dense	Yes	2015	S&B	-	0.3	-	3%	11°24'47.1"	40°08'45.3"
CD-M-32	Deciduous(Include Miombo)(Dense)	Deciduous, Less than 15 m, Dense	-	2015	N/A	2.9	-	It may be gas development	-	11°24'39.6"	40°08'45.0"
CD-M-7	Deciduous(Include Miombo)(Open)	Deciduous, Less than 15 m, Dense	Yes	May ~ October 2015	S&B	2.2	2.5	-	10%	10°54'522"	40°05'648"

Table 7 GBFM survey result in Manica in December

Survey point	Past forest type		Deforestation			Area			Remaining Crown cover (%) [1]	GPS	
	LC type on ALOS 2008	Assumed forest type from surrounding condition, Height and Crown cover	Yes/ No	Timing	Cause	Area before survey (ha)	Area from survey (ha)	Comments		Latitude	Longitude
MC-34-21		Miombo, Less than 5m,Intermediate	Yes	September 2015	Chicken farm	28.0	-	-	-	-	-
MC_34_19		Miombo, Less than 10m,Intermediate	Yes	2015	factory	98.6	-	-	-	19°05'75.0"	33°20'27.4"
MC_34_20		Deciduous, Less than 10m,Intermediate	Yes		N/A	30.8	-	This survey was conducted based on the new forest definition (Crown cover rate>30%)	20 ~ 30 %	-	-
MC_34_31		eucalyptus, Less than 20m,Open	Yes	September 2015	Felling	10.3	8.9	Artificial forest	-	19°01'12.4"	33°08'13.9"
MC_34_30		eucalyptus, Less than 20m,Open	No	2015	-	8.7	-	Select logging	40%	-	-
MC_34_35		-	No		-	-	-	Lake side	-	-	-
MC_34_17		Low forest, Less than 5m,Open	No	September ~ October 2015	-	21.9	-	Huge farm development	-	18°49'30.8"	33°02'29.4"
MC_34_18		Miombo,1Less than 5m,Intermediate	Yes	September ~ November 2015	S&B	4.9	6.8	Not clear the boarder of Forest/Non-forest GPS track was recorded only boarder clear area.	20%	18°48'40.2"	33°05'42.0"
MC_34_10		Evergreen,1Less than 5m,Dense	Yes	September 2015	S&B	4.5	3.9	-	1%	18°51'53,1"	33°10'58,4"
MC_34_11		Evergreen,1Less than 5m,Dense	Yes	June 2015	S&B	1.5	1.1	-	0%	18°52'0.27"	33°10'47.6"
MC_34_13		Miombo, Less than 10m,Intermediate	Yes	2015	S&B	0.6	0.6	-	-	18°49' 856"	33° 11' 947"
MC_34_12		Miombo, Less than 10m,Intermediate	Yes	2015	S&B	2.9	-	Only interview and photo	-	-	-
MC_34_14		Miombo,1Less than 5m,Dense	Yes	July 2015	S&B	1.1	1.2	Tree felling was done in south area last year and in north area in this year.	1 ~ 2%	18°49' 19.4"	33°11'39,6"
MC_34_25		-	No	-	-	24.6	-	-	-	19°00' 08.4"	33° 15'23.0"
Graduation		Miombo, Less than 20m,	Yes	-	Charcoal	-	-	Since 2007, tree felling has been conducted for charcoal	10%	-	-

								production, but the number of trader is increasing.			
MC_37_25		Miombo,1Less than 5m,Intermediate	Yes	2015	S&B	1.5	1.6	-	5%	-	-
MC_37_23		Deciduous, Less than 10m,Intermediate	Yes	2015	S&B	1.0	0.8	-	0%	-	-
MC_37_22		Miombo, Less than 10m,Dense	Yes	-	S&B	0.7	1.5	-	0%	18°33'00.9"	33°17'10.5"
MC_37_21		Miombo,1Less than 5m,Intermediate	Yes	2015	S&B	1.1	1.6	There is remaining big tree in central area.	1%	-	-
MC_37_20		Deciduous,1Less than 5m,Intermediate	Yes	2015	S&B	0.7	-	-	5%	18°28'30.2"	33°19'11"
MC_37_19		Deciduous,1Less than 5m,Intermediate	Yes	May 2015	S&B	1.2	2.2	Soil moisture is high	-	-	-
MC_37_18		Miombo,1Less than 5m,Intermediate	Yes	2014 and May 2015	S&B/ Charcoal	1.6	1.7	Tree felling started since 2014, full scale implementation has been started in this year	0%	-	-
MC-37_17		Miombo ,Less than 10m,Intermediate	Yes	September 2015	S&B/ Charcoal	0.7	0.8	-	0%	-	-

※No forest cover map in Manica by using ALOS 2008

Table 8 GBFM survey result in Inhambane in early and mid-August

Survey point	Past forest type		Deforestation			Area			Remaining Canopy cover (%)[1]	GPS	
	LC type on ALOS 2008	Assumed forest type from surrounding condition, Height and Canopy cover	Yes/No	Timing	Cause	Area before survey (ha)	Area from survey (ha)	Comments		Latitude	Latitude
INH03	—	Deciduous, 10m, 50%	Yes	N/A	S&B	2.04	2.58	Several big trees are left. The soil is very dry sand.	15	-23°35′10.8″	35°02′49.7″
INH04	—	Miombo, 15m, 50%	Yes	2015	S&B/ Charcoal	1.71	2.38	Forest / non-forest boundary is ambiguous.	0	-23°34′62″	35°00′46.2″
INH05	—	Miombo, 15m, Open	No	N/A	N/A	3.68	—	Dead trees can be seen. Many branches are falling.	40	-23°28′70.3″	34°57′46″
INH06	—	Deciduous, 15m, Dense	Yes	2015	S&B	10.75	—	Corporate management area. Logging by chain saws.	0	-23°27′36.5″	35°21′14.4″
INH08	—	Deciduous, 20m, Dense	Yes	August ~ September 2015	S&B	7.97	10.20	Although it is a vast area of deforestation, logging of manpower by Katana.	10	-23°26′27.7″	35°00′17.3″
INH09	—	Miombo, 10m, 50%	Yes	N/A	Forest fire	3.90	—	The soil is dry. Vegetation is beginning to recover.	10	-23°39′45.0″	34°37′41.5″
INH13	—	Deciduous, 10m, Dense	Yes	2015	S&B	0.54	—	Trees are remaining, but less than INH 03.	10	-23°05′79.8″	35°01′63.9″
INH14	—	Miombo, 15m, Dense	Yes	2015	S&B	2.40	4.50	Agricultural area is expanding in progress.	5	-23°35′90.5″	34°59′88.8″
INH15	—	Tree crops, 15m, 50%	Yes	N/A	Development (Power line)	2.44	—	Power transmission line development area. Large trees are also included within the deforestation area.	0	-23°23′49.8″	35°18′44.1″
INH17	—	Tree crops, 15m, Open	No	2015	Forest fire	13.73	—	It is not a deforestation site.	30	-23°24′36.1″	35°20′25.1″
INH18	—	Tree crops, 10m, Open	No	N/A	N/A	0.70	—	It is not a deforestation site.	N/A	-23°24′49.5″	35°20′70″
GZ02	—	Deciduous, 10m, 50%	Yes	N/A	Development	—	—	Forest loss associated with development. It is not possible to enter because of a fence.	N/A	-25°05′29″	33°09′17.4″

※No forest cover map in Inhambane province by using ALOS 2008 *1 Deforestation areas by automatic classification are used threshold -4.0 dB

Table 9 GBFM survey result in Niassa in mid-August

Survey point	Past forest type		Deforestation			Area			Remaining Canopy cover (%)[1]	GPS	
	LC type on ALOS 2008	Assumed forest type from surrounding condition, Height and Canopy cover	Yes/No	Timing	Cause	Area before survey (ha)	Area from survey (ha)	Comments		Latitude	Longitude
NS01	—	Evergreen (Pine), 20m, Dense	No	2015	Felling	7.04	—	Company owned plantation area. It is cleanly cut down.	0	-12°53' 30.93"	35°44' 33.59"
NS02	—	Evergreen (Pine), 20m, Dense	No	2015	Felling	33.30	47.74	New plantation has already begun.	0	-12°52' 48.41"	35°45' 02.50"
NS03	—	Evergreen (Pine), 10m, Dense	No	N/A	Forest fire	12.03	—	Death trees due to forest fires are seen.	0	-12°52' 36.95"	35°43' 00.00"
NS06	—	Evergreen, 15m, Dense	Yes	March ~ April 2016	S&B	0.38	—	Logging for tobacco production. The tree species of the evergreen forest is Massuco.	0	-12°47' 23.22"	35°52' 17.54"
NS12	—	Deciduous, 15m, Dense	Yes	2015	S&B	3.27	4.27	Agricultural land for maize. Although deciduous forests dominate, evergreen forests are seen in the shrub layer.	0	-13°05' 34.38"	35°29' 26.51"
NS14	—	Deciduous, 10m, Dense	Yes	2015	S&B	2.59	—	Agricultural land for maize.	0	-12°59' 07.37"	35°34' 16.54"
NS18	—	Miombo, 15m, Open	Yes	2015	S&B	1.24	1.15	Agricultural land for maize. Development is progressing now.	0	-12°57' 32.37"	35°28' 10.36"
NS19	—	Thicket	No	2015	S&B	0.37	0.63	Farmers are returning to abandoned fields and re-pioneering.	0	-12°57' 44.67"	35°27' 21.11"
NS20	—	Fallow land	No	N/A	N/A	0.50	—	N/A	0	-12°57' 26.49"	35°27' 25.04"
WT1	—	Deciduous, 20m, Dense	Yes	2013 ~ 2015	S&B	—	—	Agricultural land for the production of maize and beans.	0	-13°01' 16.87"	35°01' 45.85"
WT3	—	Miombo, 15m, 50%	Yes	2012 ~ 2013	S&B	—	—	Area where agricultural land development is progressing from 3 to 4 years ago. Mainly produce maize and beans.	0	-12°51' 21.92"	35°04' 02.99"
WT4	—	Deciduous, 10m, Open	Yes	2016	S&B	—	—	Vast area of deforestation (aggregation of small agricultural	0	-12°43' 54.09"	35°03' 15.13"

Survey point	Past forest type		Deforestation			Area			Remaining Canopy cover (%)[1]	GPS	
	LC type on ALOS 2008	Assumed forest type from surrounding condition, Height and Canopy cover	Yes/No	Timing	Cause	Area before survey (ha)	Area from survey (ha)	Comments		Latitude	Longitude
								land development). Depending on the location trunks and branches are left on the ground.			

※No forest cover map in Niassa province by using ALOS 2008 *1 Deforestation areas by automatic classification are used threshold -4.0 dB

Appendix 31 Outlines of the FRELs/FRLs submitted to the UNFCCC and the recommendations made by technical assessment (TA) to improve the FRELs/FRLs

Brazil:

Main features of FRELs/FRLs		Basis, factors, background, etc. of decision-making	Recommendations made by TA and responses
REDD+ activity included	Reducing emissions from deforestation	Development of a system to assess the effect of forest degradation by Landsat images has been on the way since 2008. Since the time series data to identify forest degradation process is not sufficient at present, "reducing emissions from forest deforestation" is not included. It will be included in the future provided that identification of forest degradation becomes possible by arranging the time series data.	It is considered to be conservative estimation not to include "reducing emissions from forest degradation in the FREL at this point of time. It was also acknowledged that Brazil will continue to analyze forest degradation process and include it in the future provided identification of forest degradation becomes possible.
Carbon pools included	AGB, BGB, litter	Among two types of soil carbon pools: (i) organic soils and (ii) organic fraction of mineral forest soils, (i) is rare in the Amazon biome. Regarding (ii), change in soil carbon after deforestation has been studied on the basis of several surveys implemented in the past, but results of those surveys are not consistent and therefore soil carbon has not been included at this point of time.	Dead wood should be included in the carbon pools in the future or more information to justify dead wood is not a significant carbon pool should be provided.
Reference period and the number of data points	Reference period: 1996 – 2005 for the FREL 2006 – 2010; 1996 – 2010 for the FREL 2011 – 2015. Data points: every year	Emissions from the high deforestation peak in 1995 are excluded from calculation and the reference period maintains consistency with those of the FRELs developed for other initiatives such as Amazon Fund, etc.	No remark.
Development of the activity data	Land use changes were accessed in accordance with the IPCC Approach 3 [1] by analyzing the Landsat images.	The forest cover maps have been updated every year since 1998 under the Gross Deforestation Monitoring Program in Amazonia (PRODES).	The start date of reference period is 1996, but the digitalized data is only arranged on 1998 and thereafter. Consequently, annual deforested area of 1996 and 1997 is estimated as average annual deforested area of the period between 1998 and

[1] One of the three methods to develop the activity data (area information) provided in the IPCC Good Practice Guidance for LULUCF. The Approach 3includes tracking of the land use changes based on spatial information.

			2000. Accuracy of estimating deforested area of 1996 and 1997 should be improved by digitalizing the deforestation maps or more information to justify the adopted method results in conservative estimation.
Development of the emission factors	The emission factors were calculated by using the data of inventory surveys carried out in the country or research papers found in the country for the forest types for which inventory data is not available. An allometric equation for estimating AGB developed in the country (Higuchi et al. 1998) was applied.	In the RADAMBRASIL project implemented in 1970 – 1985, data (DBH, height, etc.) of the all trees having DBH of 100 cm or larger were collected in 2,292 plots	The "Carbon map" that can provide information on carbon stock per unit area by forest types has some room for improvement on its accuracy because a common allometric equation is applied to the entire Amazon biome where various forest types exist. Update and revision of the "carbon map" should continue with collection of additional ground data.
Levels and method of stratification	There are 22 classes stratified by forest types.	Those classes are consistent with the stratification adopted for the 2nd national GHG inventory.	No remark
Method of extrapolating future emissions and removals from the historical data	Historical average	- No remark about adopting the historical average - The reference period is extended by 5 years in every 5 years the FREL is updated.	No remark
Socio-economic factors and national circumstances considered for future projection	FREL is not adjusted by national circumstances	No remark	No remark

Colombia:

Main features of FRELs/FRLs		Basis, factors, background, etc. of decision-making	Recommendations made by TA and responses
REDD+ activity included	Reducing emissions from deforestation	Methodology of monitoring forest degradation is currently under development. Because of high uncertainty associated with the monitoring, "reducing emissions from forest degradation" is not included at present.	TA acknowledged that Colombia has been developing methodology of identifying and monitoring forest degradation and considers including "reducing emissions from forest degradation" in its future FREL.
Carbon pools	AGB, BGB	Data on litter, dead wood and	TA acknowledged that

included		soil carbon has not been arranged at this point of time.	Colombia plans to implement national forest inventory in 2015 – 2017 and intends to include dead wood and soil carbon in its future FREL.
Reference period and the number of data points	Reference period: 2000 – 2012 The number of data points: 7 (2000, 2002, 2004, 2006, 2008, 2010, 2012)	- No remark about reasons of setting the reference period. - Colombia may envisage biennial update report to UNFCCC in association with the interval of data points (no clear description provided in the report).	TA acknowledges the cost issues behind the fact that Colombia has analyzed deforestation biennially instead of annually.
Development of the activity data	Land use changes were accessed in accordance with the IPCC Approach 3 by analyzing the Landsat images.	The activity data is based on the monitoring system of Colombia developed in accordance with guidance of UNFCCC and IPCC.	It can facilitate identifying process of regrowth, for example, to estimate historical activity data relative to a single base map rather than by treating each successive two year period independently.
Development of the emission factors	AGB was calculated by using allometric equations developed in 2012 based on data of the 631 trees collected from 721 sample plots in Amazonia Biome from 1990 to 2014. AGB was converted to BGB by using the allometric equation of Cairns et al. (1997).	Existing data was used.	Data used to develop the emission factors are not based on statistically designed sampling, but collected in plots merely set in accessible areas and therefore may have bias. Sampling for the NFI to be implemented in 2015 – 2017 has to be statistically designed in order to improve the accuracy.
Levels and method of stratification	Stratification by forest types 3 classes: - Tropical rain forests - Wet tropical forests - Wet premontane forests (99％ is tropical rain forests)	Basis of stratification - Temperature - Precipitation	No remark
Method of extrapolating future emissions and removals from the historical data	Historical average	No remark about adopting historical average	No remark
Socio-economic factors and national circumstances	The armed conflict that has continued for long years in Colombia is close to the end. During	According to the results of surveys carried out in the Central America and other countries where armed	- Magnitude of the adjustment to be made to the FREL by the post-conflict

considered for future projection	the transitional period after the end of the conflict, it is expected that people return to the forests and start reclaiming cropland and forest development will be activated until the local governance system becomes stabilized. Deforestation rate after the end of the conflict is conservatively projected to become 10% higher than the average annual deforestation rate of the period between 2000 and 2012.	conflicts took place, deforestation rate increased after the end of the conflicts.	scenario will depend on the rate at which conditions change following cessation of conflict and should be reviewed as part of the TA of any new FREL submitted by Colombia in the future. - Application of the adjustment for the current FREL would not apply in the case where an agreement to end the conflict is not reached under the current peace process.

Ecuador:

Main features of FRELs/FRLs		Basis, factors, background, etc. of decision-making	Recommendations made by TA and responses
REDD+ activity included	Reducing emissions from deforestation (only land use conversion from natural forests is included; land use conversion from plantation forests is not included).	Remaining four activities are not included in the FREL at this point of time due to lack of the data, but these activities will be included in the future FRELs/FRLs in accordance with the stepwise approach provided the data is arranged.	- Since the data required to assess potential significance of forest degradation is not arranged, collection of the data associated with emissions from forest degradation should be started. - TA acknowledged that Ecuador has been working on defining forest degradation that will enable monitoring of forest degradation.
Carbon pools included	AGB, BGB, dead wood, litter Measurement and analysis of soil carbon have been carried out but not included in the FREL. Ecuador considers including the soil carbon in its future FRELs/FRLs.	Soil carbon is not included in the FREL at this point of time because the data arrangement has not been made enough. On the other hand, measurement and analysis of soil carbon have been on the way. Soil carbon is considered to be included in the future FRELs/FRLs according to stepwise approach provided the data is arranged.	TA acknowledged that Ecuador did not include soil carbon in its FREL at this point of time because of high uncertainty of the data
Reference period and the number of data points	Reference period: 2000 – 2008 The number of data	- Activity data of 1990 was developed and forest change between	No remark.

	points: 2	1990 and 2000 was analyzed, but the change between 1990 and 2000 is not reflected on the current national circumstances and therefore, the data of 1990 was excluded from the conservative aspect. - It is expected that sustainable forest management will improve by new constitution established in 2008	
Development of the activity data	Land use change was assessed by analyzing the Landsat and Aster images according to the IPCC approach 3. The data within a year prior or after each point in time are used depending on the availability of satellite images.	Consistency with the national GHG inventory was maintained.	TA acknowledged the following points prioritized by Ecuador for improving the accuracy - Improving the accuracy of land use maps - Improving the accuracy of estimating historical land cover changes (consideration of applying direct classification of land cover changes by comparing multi-temporal composite images)
Development of the emission factors	- Carbon stock per ha of each pool was estimated by forest types, based on the result of national forest inventory carried out in 2011 -2014. - IPCC default value was applied to forest planation of which the data was not arranged.	Consistency with the national GHG inventory was maintained.	Emissions from deforestation of young forests (less than 10 years) were estimated, using the same emission factors (in t C/ha) that was used for more mature forests in the FREL. Since this would lead to a likely overestimation of emissions, recalculation of the emission factors for young forests is necessary taking into account the figures given in the IPCC guidelines on secondary forests.
Levels and method of stratification	Stratification by forest types 10 classes: - Dry Andean Forest - Pluviseasonal Dry Forest - Andean Montane	Consistency with the national GHG inventory was maintained.	No remark.

	Evergreen Forest - Andean Foothills Evergreen Forest - Andean High Mountain Evergreen Forest - Amazon Lowland Evergreen Forest - Choco Lowland Evergreen Forest - Mangrove - Morete Palms Forest - Plantation Forest		
Method of extrapolating future emissions and removals from the historical data	Historical average	No remark on reason of adopting historical average.	No remark.
Socio-economic factors and national circumstances considered for future projection	National circumstances are not considered in the FREL.	Maintaining the consistency of methodology is mentioned while suggesting possibility of revising land use change types to be included in the future FREL corresponding with national circumstances.	No remark.

Guyana:

Main features of FRELs/FRLs		Basis, factors, background, etc. of decision-making	Recommendations made by TA and responses
REDD+ activity included	Reducing emissions from deforestation Reducing emissions from forest degradation Only forest degradation due to selective logging is considered. Forest degradation that takes place by other causes (human-induced fire, small scale land-use change, expanding shifting cultivation and/or shortened fallow periods, etc.) is not considered.	- "Enhancement of forest carbon stock" is excluded at the initial stage because more than 80% of the country is forested and historically there have been few activities related to enhancing forest carbon stocks. - Inclusion of "reducing emissions from forest degradation" by causes besides selective logging and "enhancement of forest carbon stock" is considered according to the stepwise approach.	TA acknowledged Guyana will continue its effort to identify the causes of forest degradation besides selective logging.
Carbon pools included	Reducing emissions from deforestation: AGB; BGB; dead wood; litter; soil. Reducing emissions from forest degradation: AGB; GBG; dead wood.	- Impact of deforestation on each carbon pool was projected to be large and the data necessary for carbon measurement in each pool was considered to be available.	The "average annual global forest carbon stock emissions percentage" used as national circumstances only estimate AGB and BGB. In order to apply "combined reference level

	(Carbon pools are selected by activities.)	- There are the data that show no impact of selective logging on soil carbon and little impact on litter.	approach" as national circumstances, deadwood, litter and soil carbon have to be excluded to maintain consistency. Consequently, Guyana excluded these pools.
Reference period and the number of data points	Reference period: 2001 – 2012 The number of data points: 6 (2001, 2005, 2009, 2010, 2011, 2012)	- Robust and reliable activity data to identify deforestation and forest degradation are available. - Carbon data of 2010 – 2014 which is the basis of estimating emission factors are considered not to be able to be applied to the pre-2000 forests.	No remark.
Development of the activity data	The activity data was developed separately for deforestation and forest degradation. Reducing emissions from deforestation: land-use changes were assessed in accordance with the IPCC approach 3, analyzing the Landsat (2001 – 2010), Landsat/Rapideye (2011) and Rapideye (2012). Reducing emissions from forest degradation: annual timber production (unit: m^3) recorded during the period between 2011 and 2012.	- The high resolution satellite images were analyzed for the activity data at the latest point in time in order to improve the accuracy of estimating forest area at the latest point in time and verify historical forest area - Since it is difficult to identify forest degradation in terms of its area, other unit (m^3) was used.	The source of activity data is not consistent with the data used for the past national GHG inventories, but it is based on the results of latest surveys and its accuracy is considered higher than the data used for the GHG inventories. The data to be used for future national GHG inventories has to maintain consistency with the data used for the FREL.
Development of the emission factors	Deforestation: inventory survey by stratified random sampling; development of allometric equations based on biomass (destructive) survey Forest degradation: emissions (tCO_2/m^3) associated with the damage accompanied by logging operation and development of infrastructure in the concession; estimation of wood density (tCO_2/m^3).	Development of the data at Tier 3 level was aimed by arrangement of national inventory data and development of allometric equation.	Although the data used to develop emission factors are not consistent with the data used in past national GHG inventories, they are based on the result of latest survey and its accuracy is higher than the data used in the GHG inventories. The data to be used in the future national GHG inventories have to maintain consistency with the data used for development of FREL.

Levels and method of stratification	6 classes: - Large deforestation pressure/near the road - Large deforestation pressure/far from the road - Medium deforestation pressure/near the road - Medium deforestation pressure/far from the road - Small deforestation pressure/near the road - Small deforestation pressure/far from the road	- No distinct difference was seen on carbon stocks between different forest types according to the result of inventory. - More remarkable difference was seen by the level of deforestation pressure (estimated from historical deforestation patterns) and distance from the road or populated areas.	It is necessary to quantitatively project the future emissions from each class and link them with combined reference level approach used as national circumstances to adjust the FREL.
Method of extrapolating future emissions and removals from the historical data	Historical average	Average annual carbon emissions are moderately increasing during the period between 2001 and 2012 according to the statistics. There is a large impact of development of gold mining following unprecedented rise in the price of gold, which is associated with the economy crisis and no increasing trend is seen for other drivers.	No remark.
Socio-economic factors and national circumstances considered for future projection	National circumstances: deforestation rate has been historically low and forest resources are abundant, development in the forests is expected to increase. Annual carbon stock decreasing rate of Guyana in the period 2001 – 2012 (0.06%) and that of the world (0.44%) (Baccimi et al 2002) were averaged. (0.06+0.44)/2 = 0.25%/yr.	Guyana claims that an approach to average carbon stock decreasing rate of one country with that of the world (combined reference level approach) matches "raising incentives of the countries with low emissions to participate in REDD+", which is widely acknowledged in the UNFCCC.	"Combined reference level approach" was developed in 2009 which was before many COP decisions associated with REDD+ were made. More quantitative adjustment with national circumstances is necessary by accessing relationship between global average emissions and future emissions of Guyana, etc.

Malaysia:

Main features of FRELs/FRLs	Basis, factors, background,	Recommendations made

		etc. of decision-making	by TA and responses
REDD+ activity included	Sustainable forest management: only forest management in the permanent reserved forest (PRF) is considered.	- Estimation of emissions/removals based on the national GHG inventory data is possible. - The data recorded for historical forest management activities in the PRF can be used. - Forest management activities besides PRF will be included in accordance with stepwise approach, provided that the data is arranged in accordance.	Deforestation is significant as deforested area in peat swamp and mangrove between 19990 and 2012 was 530,000 ha and 40,000 ha respectively. Therefore, reducing emissions from deforestation and forest degradation should be included.
Carbon pools included	AGB, BGB	- Dead wood and soil carbon in the forest land remaining as forest land are regarded "no change" according to the Tier 1 under the IPCC guidelines. - Data of dead wood and soil carbon are not arranged because these pools are not measured in the PRF - Change in the soil carbon stock is not considered significant because land-use change cannot take place in the PRF. On the other hand, needs of technical support on soil carbon monitoring is mentioned.	Since carbon stocks in dead wood, litter and soil are estimated to be large, it is recommended to work on collecting the information related to emissions from these pools and include these pools in the future FRL.
Reference period and the number of data points		The measurement data of the PRF is arranged.	- The start date of reference period has to be 1992 or thereafter because the FRL is based on estimation that forest management will be implemented according to National Forestry Act of 1992. - In accordance with the recommendation made by TA, Malaysia set 1992 – 2005 as the reference period of the FRL for 2006 – 2010 and 1997 – 2010 as the reference period of

			the FRL for 2011 – 2015.
Development of the activity data	- Annual timber production recorded in the PRF - Historical area by forest types in the PRF	The same data and method as those used for the national GHG inventory were adopted.	Transparency of the data associated with deforested area will improve by quantitatively assessing the uncertainty of the activity data.
Development of the emission factors	- Rate of biomass increase by forest types based on the national forest inventory - R/S ratio, BCEF and carbon fraction provided in the IPCC guidelines	The same data and method as those used for the national GHG inventory were adopted.	- It is necessary to verify the rate of biomass increase calculated on the basis of NFI data. - BCEF and carbon fractions have to be applied to appropriate forest types.
Levels and method of stratification	Stratification by forest types 3 classes: - Inland forests - Mangrove - Peat swamp	Stratification is based on the International Geosphere Biosphere Programme.	No remark.
Method of extrapolating future emissions and removals from the historical data	Moving average	No remark about reason of adopting the method	No remark.
Socio-economic factors and national circumstances considered for future projection	None	Forest management system of Malaysia is mentioned as its national circumstances, but it is not considered for future projection.	No remark.

Mexico:

Main features of FRELs/FRLs		Basis, factors, background, etc. of decision-making	Recommendations made by TA and responses
REDD+ activity included	Reducing emissions from deforestation	- Reducing emissions from forest degradation is not included in the FREL for a time being but the emissions from forest degradation have been estimated. - Methodology to be applied will be improved after the result of the 3rd cycle (2015 – 2019) of NFI is obtained. - "Enhancement of forest carbon stock" will be included to the FREL in accordance with	- Forest fire is possibly associated with deforestation and FREL may be overestimated by considering "emissions from forest fire". - Mexico excluded "emissions from forest fire" from its FREL responding to comments made by TA. - TA acknowledged that Mexico intends

		stepwise approach provided more cost effective measurement method is developed.	to add other activities to its future FREL in accordance with the stepwise approach.
Carbon pools included	Deforestation: AGB; BGB Forest fire (wildfires): AGB; dead wood; litter	- Consistency with the national GHG inventory is maintained. - Emissions from soil carbon are found insignificant according to the result of survey in Mexico.	- Along with having "emissions from forest fire" excluded from the FREL, dead wood and litter were excluded from the carbon pools. - TA acknowledged that Mexico intends to add other carbon pools to its future FREL in accordance with the stepwise approach.
Reference period and the number of data points	Reference period: 2000 – 2010 Data points: 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010	Forest cover maps are developed at 4 points in time. Refer to "development of activity data" below.	No remark.
Development of the activity data	Deforestation: Land use and vegetation maps developed by National Statistics and Geography Institute (INEGI) are used. Series II (1990s): analog Series III (2002 – 2005): Landsat Series IV (2007 – 2010): SPOT 5 Series V (2011 – 2014): Landsat Land use change between the Series is assessed according to IPCC the approach 3. Forest fire: Forest fire data annually recorded by National Forestry Commission (CONAFOR)	- Series II is outside of the reference period, but the Series II data is compared with the Series III data to assess the change between the Series and consequently estimate average annual deforested area between 1993 and 2001 (annual deforested area between 2000 and 2001 in the reference period is estimated as average annual deforested area between 1993 and 2001). Likewise, the Series V is outside of the reference period, but the Series V data is used to estimate annual deforested area between 2007 and 2010). - Deforested area and area of forest loss by fire are estimated by using the maps and statistics respectively.	The Series II and Series V are outside of the reference period. Estimating deforested area in the reference period based on the data obtained outside of the reference period can lead to over- or underestimation.
Development of the emission factors	AGB (tC/ha) and BGB (tC/ha) of 18 forest classes are estimated according to the following procedure. i. estimate carbon	NFI data (21,811 forest plots) of its 1st Cycle (2004 - 2007) are used.	TA acknowledged that default figures of the IPCC guidelines were used for forest classes for which the country-specific data were not available.

	stock of individual trees ii. estimate carbon stock by forest types iii. estimate carbon stock per ha by forest types based on the activity data		
Levels and method of stratification	Stratification by forest types Forests: 18 classes	The stratification is based on classification of INEGI.	No remark.
Method of extrapolating future emissions and removals from the historical data	Historical average	Based on an assumption that the policies to be applied in the period of FREL (2011 – 2015) will not change from the reference period (2000 – 2010) and relevant forest activities will not be affected.	No remark.
Socio-economic factors and national circumstances considered for future projection	None	None	No remark.

Indonesia:

Main features of FRELs/FRLs		Basis, factors, background, etc. of decision-making	Recommendations made by TA and responses
REDD+ activity included	Reducing emissions from deforestation; reducing emissions from forest degradation	Deforestation and forest degradation are largest causes of GHG emissions relating to LULUCF in Indonesia. There is no enough data for remaining 3 activities to be included in FRELs/FRLs.	It is necessary to justify remaining 3 activities are not significant on GHG emissions to exclude those activities. The data used to estimate emissions from forest degradation can be used for estimating enhancement of carbon stocks.
Carbon pools included	AGB, organic soil carbon (peatlands only)	There is not enough data on BGB, dead wood and litter for developing national level FRELs/FRLs.	Carbon stocks in BGB and dead wood are expected to be significant taking into account the data provided by Indonesia in the past. It is recommended to include those carbon pools, using the default values (e.g. R/S ratio) of the IPCC guidelines.
Reference period and the number of data points	Reference period: 1990 – 2012 Data points: 8 (1990, 1996, 2000, 2003, 2006, 2009, 2011, 2012)	FRELs/FRLs were compared between longer reference period and shorter reference period. Longer reference period makes it possible to reflect changes of policies, socio-economic conditions, etc. and hence	There is no comment requiring the revision.

		longer reference period was adopted.	
Development of the activity data	Forest cover maps are developed by visual-interpreting the Landsat images for each data point during the reference period. Then, deforested or forest-degraded area was estimated, analyzing changes between each data point.	Forest data including the forest cover maps, etc. have been updated periodically under the national forest monitoring system that has been implemented since 2000.	Analytical errors can be reduced by analyzing forest cover changes directly from the satellite images rather than developing forest cover maps. Although the Indonesian side recognizes superiority of the method suggested by TA, it claims that the method is difficult to apply in Indonesia because there are various vegetation types in the country. However, Indonesia intends to continue making an effort to improve analytical method and reduce the errors.
Development of the emission factors	Emission factors are calculated, based on the result of the NFI implemented from 1989 to 2013. Additional surveys were implemented for the forest types (e.g. mangrove, etc.) for which the number of sampling plots was small in the NFI.	For emission factors of the soil carbon of peatlands, the default values provided in "2013 Supplement to the 2006 IPCC Guidelines for National GHG Inventory: Wetlands" are used. The Indonesian side claims that the default values are at Tier-2 level because the values are calculated on the basis of data obtained from the surveys carried out in Indonesia.	There is not enough sample data for certain regions or forest types (e.g. Java, mangrove, etc.). Indonesia is making an effort to improve the NFI and accuracy of emission factors. Carbon stock of deforested areas is not considered, leading to overestimation of the emissions by deforestation. The default emission factors of soil carbon derived from the IPCC guidelines are only applicable to "drained organic soil". However, the FREL of Indonesia does not distinguish drained area from undrained area. Responding to this comment, the Indonesian side claimed validity of applying the default values of the IPCC guidelines to the entire peatland, explaining that area of undrained peat forest is very small and distinguishing drained area from undrained is not possible. On the other hand, Indonesia plans to collect additional data of peatland.
Levels and method of stratification	AGB: 6 classes (primary dryland forest, secondary dryland forest, primary swamp forest,	Plantation forest is included in the forest category in the GHG inventory reported in the biennial updated report.	It becomes possible to estimate the amount of emissions or removals of land cover/use changes between natural forests and

	secondary swamp forest, primary mangrove forest, secondary mangrove forest Soil carbon: 18 classes		plantation forests by adding the plantation forests to the land cover/use categories and hence overestimation of GHG emissions or removals would be mitigated.
Method of extrapolating future emissions and removals from the historical data	Historical average	No remark on reason of selecting the method	No remark
Socio-economic factors and national circumstances considered for future projection	FREL not adjusted by national circumstances	No remark	No remark

Peru:

Main features of FRELs/FRLs		Basis, factors, background, etc. of decision-making	Recommendations made by TA and responses
REDD+ activity included	Reducing emissions from deforestation	Emissions from deforestation are the largest among the entire emissions on LULUCF in the Amazon region for which the FREL was developed.	Reason of excluding the activities besides "reducing emissions from deforestation" is not explained.
Carbon pools included	AGB, BGB	Emissions from soil carbon by deforestation were 412 Gg CO2 eq (0.41% of the entire emissions) according to the national GHG inventory of 2012 and hence soil carbon was considered not-significant and excluded from the carbon pools for measurement.	Reasons of excluding dead wood and litter from the carbon pools to be measured are not explained. Insignificance of these carbon pools has to be explained or these carbon pools have to be included using the default values of the IPCC guidelines.
Reference period and the number of data points	Reference period: 2001 – 2014 Data points: 14 every year)	Reference period was set prior to 2015 in which the forest policy changed	No remark
Development of the activity data	Forest cover change maps comprising "deforested" and "not deforested" were developed by analyzing the Landsat images (5, 7, 8).		Error of activity data can be reduced by analyzing land use changes in association with forest cover changes.
Development of the emission factors	Emission factors were calculated, based on the data (of 1,152 plots) of surveys previously carried out combined with a part of the NFI	Implementation of the 1st NFI is on-going. After the NFI completes, emission factors will be recalculated and the FREL will be revised, based on the finalized NFI data.	Emission/removal factors of post deforestation have to be calculated. If the data for calculating them are not available, default values of the IPCC

	data (of 50 plots). Carbon stock of deforested areas is 0.		guidelines can be used and the data should be arranged in the future according to stepwise approach.
Levels and method of stratification	6 classes according to eco-zones: coast; mountain; forests (easy access); forests (difficult access); lowland forests; wetland	The on-going NFI adopts stratification according to eco-zones.	Forests should be further divided according to management systems (natural forests, plantation forests, etc.).
Method of extrapolating future emissions and removals from the historical data	Emission trend of the reference period is linear-extrapolated. Emission (t CO2 eq) = 3,226,683.45 * (year) – 6,424,196,675.76	Deforestation is in increasing trend during the reference period.	Deforestation trend during the reference period has to be quantitatively analyzed in association with deforestation causes and information to project how the deforestation causes affect forests in the future has to be provided.
Socio-economic factors and national circumstances considered for future projection	FREL not adjusted by national circumstances	The reference period is set prior to 2015 in which change of forest policy that can be considered as a national circumstance started.	No remark

Ministry of Land, Environment and Rural Development
in the Republic of Mozambique

Japan International Cooperation Agency

THE PROJECT FOR THE ESTABLISHMENT OF SUSTAINABLE FOREST RESOURCE INFORMATION PLATFORM FOR MONITORING REDD+ IN THE REPUBLIC OF MOZAMBIQUE

Technology Transfer Implementation Report

March 2018

Japan Overseas Forestry Consultants Association

Kokusai Kogyo Co., Ltd.

Contents

Acronyms

AIFM	**Integrated Assessment of Land and Forests**
AFD	**French Development Agency**
AGB	**Above Ground Biomass**
ALOS	**Advanced Land Observing Satellite**
ANAC	**Nacional Administration of Conservation Areas**
AVNIR-2	**Advanced Visible and Near Infrared Radiometer-2**
AQUA	**National Agency for Environmental Quality Control**
BA	**Burned Area**
BCEF	**Biomass Conversion and Expansion Factor**
BGB	**Below Ground Biomass**
BUR	**Biennial Update Report**
C/P	**Counter Part**
CDS	**Centre for Sustainable Development**
CENACARTA	**National Centre of Cartography and Remote Sensing**
DBH	**Diameter Breast Height**
DINAB	**National Directorate of Environment**
DINAGECA	**National Directorate of Geography and Cadaster**
DINAF	**National Directorate of Forests**
DINAT	**National Directorate of Lands**
DFRI/DIRF	**Department of Forest Resources Inventory**
DNRI/DIRN	**Department of Natural Resources Inventory**
DNTF	**National Directorate of Lands and Forests**
DPTADER	**Provincial Department of Land, Environment and Rural Development**
FCPF	**Forest Carbon Partnership Facility**
FNDS	**National Fund for Sustainable Development**
FREL/FRL	**Forest Reference Emission Level/ Forest Reference Level**
GBFM	**Ground-Based Forest Monitoring**
GHG	**Greenhouse Gas**
GIS	**Geographic Information System**
GIZ	**Gesellschaft für Internationale Zusammenarbeit**
GOFC-GOLD	**Global Observation of Forest and Land Cover Dynamics**
GPS	**Global Positioning System**
GT	**Ground Truth**
IGN FI	**National Institute of Geographic and Forest Information France International**
IIAM	**Mozambique Institute for Agrarian Research**
IIED	**International Institute for Environment and Development**
IND	**National Demining Institute**
INTIC	**National Institute for Information Technology and Communication**
JAXA	**Japan Aerospace Exploration Agency**
JCC	**Joint Coordination Committee**
JICA	**Japan International Cooperation Agency**
JJ-FAST	**JICA-JAXA Forest Early Warning System in the Tropics**
MASA	**Ministry of Agriculture and Food Securtiy**
MCA	**Millennium Challenge Account**
MICOA	**Ministry of Coordination of Environmental Affairs**
MINAG	**Ministry of Agriculture**
MITADER	**Ministry of Land, Environment and Rural Development**
MODIS	**Moderate Resolution Imaging Spectroradiometer**
M & MRV	**Monitoring & Measurement, Reporting and Verification**
MRV	**Measurement, Reporting and Verification**
NFI	**National Forest Inventory**

NGO	**Non-Governmental Organization**
OJT	**On-the-Job Training**
PALSAR	**Phased Array Type L-band Synthetic Aperture Radar**
PaMs	**Policy and Measures**
PEDSA	**Strategic Plan for Sustainable Development of Agriculture**
QA/QC	**Quality Assurance/Quality Control**
RD	**Record of Discussion**
REL/RL	**Reference Emission Level/ Reference Level**
R-PP	**Readiness Preparation Proposal**
SADC	**Southern African Development Community**
SAR	**Synthetic Aperture Radar**
SBSTA	**Subsidiary Body for Scientific and Technological Advice**
SDAE	**Services for Economic Activities**
SPF	**Provincial Service of Forest**
SPFFB	**Provincial Service of Forest and Wildlife**
SPGC	**Provincial Service of Geography and Cadaster**
SPOT	**Satellite Pour l'Observation de la Terre**
TWG	**Technical Working Group**
UEM	**Eduardo Mondlane University**
UNFCCC	**United Nations Framework Convention on Climate Change**
UPG	**Pedagogic University**
USAID	**United States Agency for International Development**
UT-REDD+	**REDD+ Technical Unit**
WB	**World Bank**
ZAE	**Agroecological Zoning**

Introduction

The paper is called as the Technology Transfer Report for “The Project for the Establishment of Sustainable Forest Resources Information Platform for Monitoring REDD+” (hereinafter referred to as “the Project”) which has been implemented in accordance with the Record of Discussion (R/D) which Ministry of Agriculture of the Republic of Mozambique and Japan International Cooperation Agency signed and exchanged on 12th October 2013 upon agreement. The Technology Transfer Report explains the concept and the programs of the technology transfer implemented for five years during period of the Project for the 6 (six) fields which are forest resources information platform (Data base and GIS), remote sensing, forest inventory, forest monitoring, REL/RL and biomass and carbon estimation in the project implementation.

1. Overall concept for the technology transfer

The fields for the implementation of the technology transfer for capacity building in the Project are 1) forest resources information platform (Data base and GIS), 2) remote sensing, 3) forest inventory, 4) forest monitoring, 5) REL/RL and 6) biomass and carbon estimation. The outputs which have been generated from the project activities relating the field from 2) to 6) have been stored as the data and information in the forest resources information platform. Since all outputs in the Project have been integrated in the forest resources information platform as mentioned, sustainable management and operation of the platform is indispensable. Therefore, firstly, overall concept for the technology transfer for the sustainable management and operation of the platform are mentioned in the below paragraph.

Capacity development is important to ensure that the forest resource information platform developed in the Project will continue to be managed properly by the counterparties and related agencies even after the end of the Project. As shown in Fig. 1.1, as a framework for such capacity development an approach based on the following two perspectives is vital: (I) human-resources development to improve the counterparties' technical and operational capabilities with regard to management of the forest resource information platform, and (ii) enhancement of coordination and sharing of information to establish networks and backup systems on human resources, materials, and finance with other donors and related agencies. With respect to human-resources development, the current capabilities of the counterparties and their existing skills and knowledge was assessed first, and then what they lack has been assessed. Then, based on the results of assessment and their needs development of effective programs has been considered. In addition, with respect to enhancement of coordination, the content of activities of other donors and related agencies, their philosophies, and their relationships with the counterparties in the past activities, has been assessed, and then the types of cooperation requests needed for platform management have been considered. At the same time, consideration also has been given to the issues faced by each donor and related agency, then the Project has aim at an establishment of a more sustainable network with co-benefits through proposal of types of cooperation that counterparties whose capabilities have improved through the Project can deliver.

Next, overall concepts for the methodology of the technology transfer are mentioned as follows. There are three approaches that can be used to promote the technology transfer for the 6 fields from 1) to 6) mentioned above: 1) training programs (off-the-training), 2) on-the-job training (OJT), and 3) seminars and workshops to disseminate technology.

Firstly, training programs have been implemented to improve staff capabilities in technical areas of remote sensing, forest GIS, forest inventories, setting of REL, etc. as well as the platform management. In doing so, securing the appropriate training environments and the human resources in Mozambique to be in charge of lectures and/or practical training have been studied. In addition, scheduling of the training considering the counterparties' busy periods has been studied. Also, method of support to make it possible for trainees to transfer skills to other human resources in the future, through incorporating ToT (Training of Trainers) elements into the training, has been studied as well. Furthermore, in fields requiring training in Japan, plans have been prepared for effective and efficient training in consultation with counterparties and then such trainings have been conducted with the agreement of JICA. Tests and surveys have been conducted to assess objectively improvements in counterpart staff capabilities and the appropriateness of training, and the findings have been reflected in subsequent training programs.

Secondly, efforts have been made to ensure that counterpart staff firmly retains the capabilities improved through the training programs, through the On-the-Job-Training (OJT) by the working together for the Project activities. Particularly, the Technical Working Groups (TWG) set up for the discussions of technical and management issues for consideration in the implementation of activities in each field can be important places for the OJT. In addition, performance of the counterpart staff has been improved through ensuring that counterparties firmly retain not just technical skills but also management skills such as management planning to properly employ the skills acquired through training, organizational and structural development, and monitoring systems. OJT has cover not just central government agencies but also local government agencies and other parties working together on the Project, to improve dynamics of the Project as a whole while sharing information on problems and solutions encountered in performance of each other's duties. For example, since forest monitoring requires development of monitoring structures not just by the DNTF/DINAF alone but through cooperation with the SPFFB/SPF at the provincial level and the SDAE at the district level, this approach related to the organizations at all level help improve capabilities related to methods of monitoring in the field and reporting systems.

Lastly, holding seminars and workshops can be contributed to the dissemination of technologies to the stakeholders including other donors and related agencies, which are for the development of networks and backup systems for carrying out platform management into the future, setting REL/RL and estimation of biomass and carbon stock in the forests etc. In these seminars and workshops, counterpart staff has presented overviews of survey results and survey methods, broadly sharing knowledge and lesson learned from surveys with other related parties. This is intended to ensure the continuation of the Project, through deepening the understanding of counterpart organizations and cooperating with related agencies even after the Project ends. In preparing materials for use in these seminars and workshops, efforts have been made to prepare concise and easily understandable materials that identify specific case studies concerning matters such as Project survey results and implementation policies for future plans. For example, when donors use different languages there is a need for consideration of steps such as preparing materials in both English and Portuguese or increasing the amount of visual information such as video materials. Also, after information is shared with related agencies at seminars, workshops need to be held for other donors and agencies to organize working groups, share data on a continual basis, and develop funding mechanisms, for purposes of sustained platform management. Effective implementation strategies for use in these workshops, such as formulation of plans for sustained management of the forest resource information platform in a participatory manner, have been designed jointly with the organizer counterparties; to encourage the official efforts needed in future cooperation.

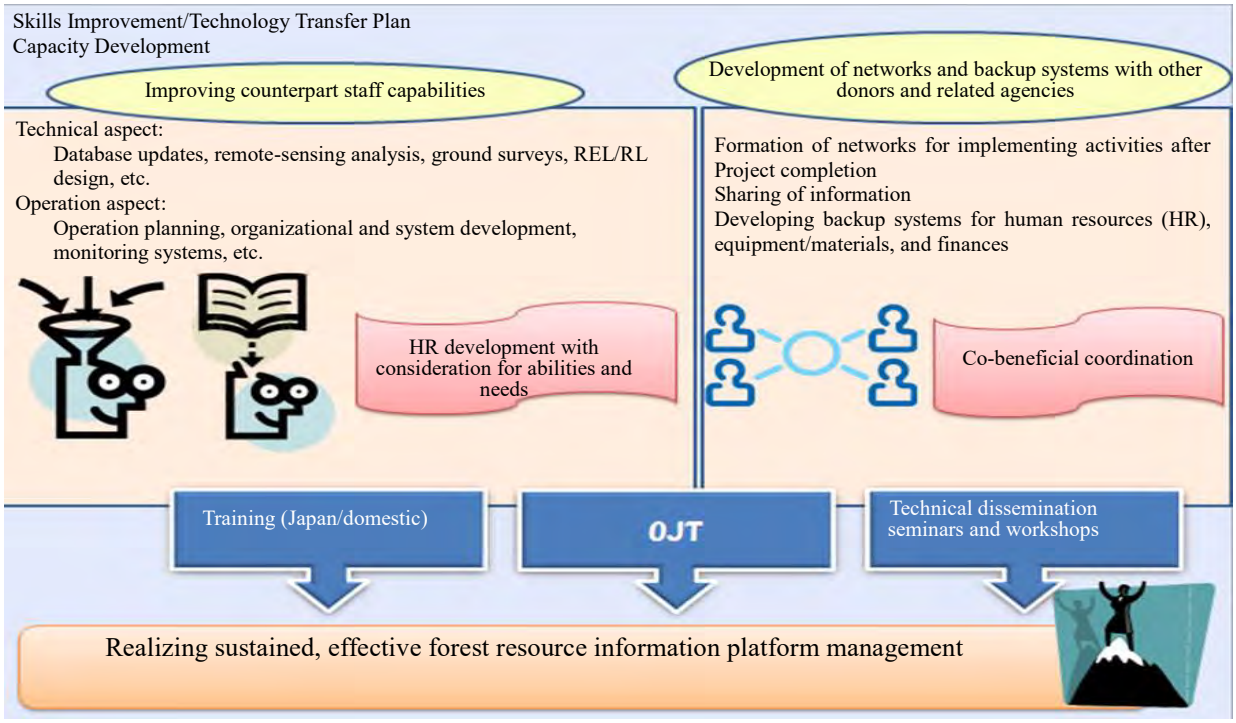

Fig. 1.1: Conceptual diagram of effective capacity development

2. Technology transfer of each field

In this chapter 2, concept and targets, and programme for each field mentioned in chapter 1 are mentioned. In the section of "concept and targets" for each field, it is mentioned in which concept capacity development for technology transfer is implemented, who are target persons for the technology transfer and what targets for the achievement are aimed.

In the section of "programme", concrete programme such as title, participants, contents, time/ duration, method, venue, trainer, achievement goal based on the programme implemented. are mentioned.

2.1 Database and GIS Field

2.1.1 Concepts and Targets

1) Concepts of Capacity building

- Following table shows the relationship between the information system life cycle (IT development Phase) and the required skills (Job Category). According this table, there are 4 IT investment phases and 8 job categories.

IT investment Phase / Job Category	Management strategy formulation		Strategic information planning		Development		Operation and maintenance	
	Formulation of Management goals/vision	Formulation of business strategies	Clarification and analysis of issues (business/IT)	Solution design (structure /pattern)	Component design (system/ operation)	Solution construction (development/ construction)	Solution operation (system/ Operation)	Solution maintenance (system/ operation)
Sales	Confirmation of goals and visions	Confirmation of business strategy	Business issues Solutions proposal					
Consultant	Proposal for goals and visions	Advice for formulation of business strategy	Advice for solution formulation	Solution design				
IT Architect			Formulation of solution framework	Design of solution architecture	Components design	Solution construction		
Project Management			Formulation of basic project plans	Management and control of projects	Management and control of projects	Management and control of projects	Management and control of projects	Management and control of projects
IT Specialist				Formulation of system configuration plan	System components design	Installation and construction of system components	Operation support of System components	Maintenance of system components
Application Specialist				Formulation of application development plan	Application components design	Development of application components	Operation support of application components	Maintenance of application components
Customer Service					Formulation of installation planning	Installation of hardware and software	Maintenance of hardware and software	Maintenance of hardware and software
IT Service Management						Formulation of operation plan /operation management	Operation and management of systems	Operation and management of systems

Main phase of activity Sub phase of activity

Source: Skill Standards for IT Professionals Ver.3 (2008), Ministry of Economy, Trade and Industry. INFORMATION-TECHNOLOGY PROMOTION AGENCY, JAPAN

- Regarding four IT investment phases, the role of the Project and DNTF/DINAF officers are shown at the following table. Although each IT investment phase is important for the forest resource information platform, the skill for "Management strategy formulation" is required for the executive or management class and the skill for "Development" is not suitable for the land and forestry management officers because system development experience is required for learning this skill. Thus, the capacity

development for “Strategic information planning” and “Operation and maintenance” should be focused on this training.

IT investment phase	Role of the Project and DNTF/DINAF officers
Management strategy formulation	The strategy of the platform is designed in this phase. It is necessary to learn this skill for the executive or management class.
Strategic information planning	Analyzing current issues and creating the solutions are required for providing necessary function and information. The results of this phase contribute to the next phase.
Development	Expertise skill, programming in here, are required to develop the platform. It is not appropriate for the government officers to learn this skill. Instead of the government officers, system developer has responsibility for this phase not only in LIMS or SISFLOF but also in the Japanese government.
Operation and maintenance	This is an important skill for the sustainable operation of the platform. It is necessary to manage and maintain the platform by the officers.

- Concept for the technology transfer of “Strategic information planning”
  - The personnel who can understand the workflow from database design to development and can provide the required and/or useful information for design (current issues and solutions, function and data for implementation) was trained. The personnel is able to contribute to the system extension or new database.
  - The main targets are as follows
    - End users of database
      - Capacity building has been implemented in regard to the analysis of information necessity for users, the data specification, and the functionality of the database. In training exercises, trainees have developed basic skills for the workflow of database design as the technical personnel for “Strategic information planning”.
    - System/database operator
      - Capacity building has been implemented in regard to the analysis of information necessity for users, the data specification, the functionality of the database, and the integration of existing system. In training exercises, trainees developed basic skills for the workflow of database design as a technical personnel and the interface between the system developer and the end users for “Strategic information planning”.
- Concept for the technology transfer of “Operation and maintenance”
  - The personnel who can operate and maintain the platform sustainability from the point of view both system and data should be developed. The data can be timely maintained. The system can be operated sustainably by these personnel.
  - The main targets are as follows
    - System/database operator

- Capacity building has been implemented in regard to the basic functions of a DBMS (data base management system), the installation of related software, and the backup and the restoration of databases. In training exercises, trainees have developed basic skills for the operation of the database as technical personnel for "Operation and maintenance".

✧ Data creator

- In GIS part, capacity building has been implemented in regard to the fundamental concepts and basic functions of a GIS, the properties of GIS maps, and the structure of a GIS database. In training exercises, trainees have developed basic software skills by working with ArcGIS Desktop 10 tools to visualize geographic data, create maps, query a GIS database, and analyses data using common analysis tools. This training is designed for engineers/technical personnel from each province and was implemented at central location. Training was implemented using local subcontract at Japanese experts' direction.

2）Level of capacity before start of training and achievement level after training

- Technology transfer of "Strategic information planning"
  - ➢ End users of database
    - ✧ Trainees do not have any database education or workplace experience with DBMS in advance, but have the experience of using the database as the end users.
    - ✧ By the end of the training, trainees understood the database structure and are able to explain the data specification and the functionality of the database on the specific documents.
  - ➢ System/database operator
    - ✧ Trainees do not have any database education or work experience with DBMS in advance, but have the basic knowledge of information technology.
    - ✧ By the end of the training, trainees understood the design documents created by the system developer and be able to create the simple design document by themselves.
- Technology transfer of "Operation and maintenance"
  - ➢ System/database operator
    - ✧ Trainees do not have any prior database education or workplace experience with DBMS, but have the basic knowledge of information technology.
    - ✧ By the end of the training, trainees understood the functionality of the DBMS and be prepared to install the platform, maintain (add, update, and delete), backup, restore the data, and instruct as the user of the platform.
  - ➢ Data creator
    - ✧ Trainees do not have any GIS education or workplace experience with GIS in advance.
    - ✧ By the end of the training, trainees understood the range of ArcGIS Desktop functionality and be prepared to work with the software on their own to create GIS maps, work with geographic data, and perform GIS analysis.

2.1.2 Program

1) Detailed programme implemented in the first year (from April 2013 to March 2014)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Database design procedure	TWG members	● Sorting user needs ● Sorting functionality of database ● Sorting data specification	June, October, and January to February (4days)	OJT in TWG	Maputo	K. ISHII	Participants understand how to sort the information required in database design.
Introduction of the platform	TWG members and interns of DNRI	● Introduction of the platform	February (1day)	Workshop	Maputo	K. ISHII	Participants understand the concept, functionality and data items of the platform.
Maintenance of the platform	TWG members and interns of DNRI	● Update of the platform contents ● Update of the maps	February (1day)	Workshop	Maputo	K. ISHII	Participants understand how to update the platform contents and the maps.

2) Detailed programme implemented in the second year (from April 2014 to March 2015)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Database design procedure	TWG members	● Sorting functionality of database ● Sorting data specification	August and February (2days)	OJT in TWG	Maputo	K. ISHII	Participants understand how to sort the information and the function required in database
Introduction of the platform	DNTF and related organization of the platform such as MICOA	● Introduction of the platform	February (1day)	Workshop to report the results of 2nd year project	Maputo	K. ISHII	Participants understand the concept, functionality and data items of the platform.
Maintenance of the platform	TWG members and the candidates of the system manager, the information manager, the information provider of the platform	● Update of the platform contents	February (1days)	Lecture and exercise	Maputo	K. ISHII	Participants understand how to update the platform contents.

3) Detailed programme implemented in the third year (from April 2015 to March 2016)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Management structure of the platform	TWG members	● Discussing the management structure of the platform for establishing a coordination meetings for operation and update of the platform	February (1days)	OJT in TWG	Maputo	K. ISHII	Participants design the management structure of the platform.
Handling of the platform	TWG leader	● Practice of handling of the platform	March (1day)	Lecture and exercise	Maputo	K. ISHII	Participants explain functionality of the platform
Introduction of the platform	DINAF and related organization of the platform such as IIAM	● Introduction of the platform	February (1day)	Workshop to report the results of 3rd year project	Maputo	K. ISHII	Participants understand the concept, functionality and data items of the platform.

4) Detailed programme implemented in the fourth year (from April 2016 to March 2017)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Database design procedure and management structure of the platform	TWG members	● Sorting functionality of database ● Sorting data specification ● Discussing data to be disclosed and not to be disclosed	May (1days)	OJT in TWG	Maputo	K. ISHII	Participants understand how to sort the information and the function required in database
Introduction of the platform	TWG members	● Introduction of the platform	August (1day) and February (1day)	Lecture	Maputo	K. ISHII	Participants understand the concept, functionality and data items of the platform and can explain it to other parties.

Installation and maintenance of the platform	Candidates of the system manager	● Installation of the platform ● Update of the platform contents	February (2days)	Lecture and exercise	Maputo	K. ISHII	Participants understand how to install the platform and update the platform contents.

5) Detailed programme implemented in the fifth year (from April 2017 to February 2018)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Installation and maintenance of the platform	TWG members and the candidates of the system manager, the information manager, the information provider of the platform including UT-ERDD+ staff	● Installation of the platform ● Update of the platform contents ● Creation of the report	August (1day) February(1day)	Lecture and exercise	Maputo	K. ISHII	Participants understand how to install the platform, update the platform contents, and create the report form.

2.2 Remote Sensing Field

2.2.1 Concepts and Target

In the remote sensing field, the Project intends to achieve three main objectives: (1) developing the forest cover/land use base map using high resolution optical satellite imagery (ALOS AVNIR-2), (2) developing forest cover/land use map in reference years through land cover change detection using medium resolution optical satellite imagery (LANDSAT 5, 7 and 8), and (3) the forest cover change monitoring using radar satellite imagery. At the same time, necessary techniques and knowledge are transferred to DIRF officers through various project activities.

First, necessary techniques and knowledge for the forest cover base map development have been transferred mainly through a series of OJTs, and lectures and exercises were also organized as needed. The series of OJTs were conducted in accordance with the progress of the forest cover base map development, and relevant activities included ground truth surveys, preprocessing of optical satellite imagery, and classification analysis. During the above-mentioned OJTs and other activities, target DIRF officers examined and understood a set of works required for the forest cover base map development using newly prepared remote sensing and ground truth survey operation manuals as reference.

Second, since the third year of the Project, DIRF officers and RS-TWG members discussed the forest cover map development in reference years for FRELs/FRLs based on the forest cover base map prepared by the Project. In the fifth year, in the same manner as the forest cover base map development, relevant techniques have been transferred through a training in Japan and domestic OJTs, and lectures and exercises have been also organized as needed. Moreover, because it is planned that DIRF officers would continue to update the forest cover maps every five years using freely available medium resolution optical satellite imagery (e.g. LANDSAT 8) after the end of the Project, technical transfer activities played an important role in the improvement of their skills and knowledge about optical satellite imagery analysis to classify and interpret satellite imagery and develop forest cover maps in the future.

Finally, the technical transfer activities for the forest cover change monitoring using radar satellite imagery has been conducted only through lectures and exercises because of DIRF officers' insufficient experiences with radar imagery analysis at the beginning of the Project. The lectures and exercises have been conducted for every year using data and software previously provided through such programs as the Japan Grant Aid and the JAXA KC3 and KC4 and presently available at their office. It is also expected that target DIRF officers would understand basic radar imagery analysis for forest cover change monitoring using a newly prepared radar imagery analysis operation manual.

2.2.2 Program

1) Detailed programme implemented in the first year (from April 2013 to March 2014)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Introduction of Remote Sensing Analysis	RS-TWG members	● Discussing specifications and classification items of forest-cover maps.	July (2 days)	OJT in TWG	Maputo	M. Kawai	DNRI officers understand the needs for considering map specifications and classification items.
Ground Truth Survey	DNRI officers	● Examining features (colors and textures) of satellite imagery. ● Verifying correspondences between the features and actual vegetation types in the field. ● Preparing survey records for classification analysis.	October and November (2 weeks)	OJT in Field Practice	Maputo and two target provinces (Cabo Delgado, and Gaza)	○ *1 T. Nakanishi M. Kawai	DNRI officers understand how to interpret satellite imagery and develop correspondences between satellite imagery and actual land-cover types.
Basic Analysis of Radar Imagery (ALOS/PALSAR)	DNRI officers (Mainly JAXA PI/CI members)	● Practicing basic analysis using ALOS/PALSAR imagery.	October (1 week)	Lecture and Exercise	Maputo	M. Kawai	DNRI officers become familiar with the radar satellite imagery, and understand basic analysis method for ALOS/PALSAR.
		● Understanding the characteristics of optical and radar imagery. ● Practicing relevant software such as ERDAS Imagine and ArcGIS.	February (3 days)				DNRI officers become familiar with the remote sensing analysis software and understand basic satellite imagery processing and analysis.
Introduction of Developing Forest Cover Map	RS-TWG members	● Discussing about specifications and classification items of forest-cover maps.	February (2 days)	OJT in TWG	Maputo	○ T. Nakanishi M. Kawai	DNRI officers understand the needs for considering map specifications and classification items.

*1 Circles (○) indicate the person who is in charge for the relevant technical transfer activitie(s).

2) Detailed programme implemented in the second year (from April 2014 to March 2015)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Provisional Forest-Cover Map based on Optical Imagery	RS-TWG members	● Discussing the automatic classification results and classification items and flow of the forest-cover maps.	May and July (2 days)	OJT in TWG	Maputo	M. Kawai	RS-TWG members understand the image of the forest-cover maps and the definition of classification items.
		● Discussing the automatic classification results of the forest-cover maps referring to the additional GT survey results.	September (1 day)				RS-TWG members understand the automatic classification results and work contents necessary for the following visual interpretation.
		● Discussing visual interpretation results of the forest-cover maps.	February (2 days)			○ T. Nakanishi M. Kawai	RS-TWG members understand how to improve the forest-cover maps by the visual interpretation.
Additional Ground Truth Survey	DNRI officers CENACARTA officer	● Examining features (colors and textures) of satellite imagery. ● Verifying correspondences between the satellite imagery and actual vegetation types in the field. ● Preparing survey records for classification analysis.	May and June (2 weeks)	OJT in Field Practice	Maputo and two target provinces (Cabo Delgado and Gaza)	M. Kawai	DNRI officers and CENACARTA officer understand how to interpret satellite imagery and develop correspondences between satellite imagery and actual land-cover types. The provisional ground truth implementation method manual is prepared.
Ground Truth Survey for the forest-cover map development using 2010 Landsat imagery	DNRI officers	● Examining features (colors and textures) of LANDSAT imagery. ● Verifying correspondences between the imagery features and	August and September (2 weeks x 2 times)	OJT in Field Practice	Manica, Tete, and Niassa provinces	M. Kawai	DNRI officers understand how to interpret LANDSAT imagery and develop correspondences between the satellite

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
		actual vegetation types in the field. ● Preparing survey records for LANDSAT classification analysis.					imagery and actual land-cover types. DNRI officers understand correspondences between the satellite imagery and actual land-cover types that are found outside of the two target provinces.
Basic Remote Sensing Analysis (Continued)	DNRI officers RS-TWG members	● Understanding the characteristics of optical and radar imagery. ● Understanding how to find deforestation areas on radar imagery. ● Practicing relevant software such as ERDAS Imagine and ArcGIS.	February (1 week)	Lecture and Exercise	Maputo	M. Kawai	DNRI officers and RS-TWG members understand how to find deforestation areas on radar imagery using remote sensing analysis and GIS software. The remote sensing analysis method manual is prepared and revised when necessary.

*1 Circles (○) indicate the person who is in charge for the relevant technical transfer activitie(s).

3) Detailed programme implemented in the third year (from April 2015 to March 2016)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Provisional Forest-cover Map based on Optical Imagery	DNRI officers	● To update the shifting cultivation areas of the forest-cover maps by visual interpretation.	April (2 weeks) *(Continuing from March)*	OJT	Maputo	M. Kawai T. Nakanishi	DNRI officers understand how to improve the forest-cover maps by the visual interpretation.
Reviews about Forest-cover Maps for Gaza and Cabo Delgado Provinces	DNRI officers	● To review and discuss about the visual interpretation results (Shifting cultivation and villages) of the forest-cover maps for Gaza and Cabo Delgado Provinces.	December (1 week)	OJT	Maputo	T. Nakanishi	DNRI officers understand how to improve the forest-cover maps by visual interpretation.
Preparation of Provisional	DNRI officers	● To examine characteristics of different satellite imagery	June (2 weeks)	OJT	Maputo	T. Nakanishi	DNRI officers understand how to practice

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Forest-cover Map using Some Optical Imagery Scenes		including ALOS AVNIR-2 and LANDSAT. ● To practice the data pre-processing and object-based classification analysis following the RS Guideline.					classification analysis to develop the forest-cover maps from satellite imagery.
	DNRI officers	● To examine characteristics of different satellite imagery including ALOS AVNIR-2 and LANDSAT. ● To practice the data pre-processing and object-based classification analysis following the RS Guideline. ● To exercise the method to prepare pan-sharpened imagery.	August (2 weeks)	OJT	Maputo	T. Nakanishi	DNRI officers understand how to practice classification analysis to develop the forest-cover maps from satellite imagery. DNRI officers understand how to prepare pan-sharpened imagery.
	DNRI officers	● To examine characteristics of different satellite imagery including ALOS AVNIR-2 and LANDSAT. ● To practice the data pre-processing and object-based classification analysis following the RS Guideline. ● To prepare an error matrix to examine the classification results.	November and December (2 weeks)	OJT	Maputo	T. Nakanishi	DNRI officers understand how to practice classification analysis to develop the forest-cover maps from satellite imagery and how to examine the classification results. DNRI officers understand how to interpret satellite imagery. Interpretation cards (draft) are prepared to illustrate the interpretation criteria.
Revision of Forest-cover Map and Forest-cover Maps for Reference Years	RS-TWG members	● To discuss about a tentative method to revise the 2008 forest cover maps due to the new forest definition.	March (2 days)	TWG	Maputo	T. Nakanishi M. Kawai	RS-TWG members understand the tentative method to revise the 2008 forest cover maps.

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
		● To discuss about a tentative method to develop forest-cover maps of reference years.					RS-TWG members understand the tentative method to develop forest-cover maps for reference years.
Radar Imagery Analysis	DNRI officers	● To detect deforestation areas for GBFM GT survey using ALOS-2 radar imagery.	August (2 weeks)	OJT	Maputo	M. Kawai	DNRI officers understand how to detect deforestation area from ALOS-2 imagery.
	DNRI officers RS-TWG members	● To understand how to find deforestation areas on radar imagery. ● To detect the deforestation areas using ALOS-2 radar imagery and summarize the results in the Radar image analysis guideline.	February (2 weeks)	Lecture and Exercise	Maputo	M. Kawai	DNRI officers and RS-TWG members understand how to find deforestation areas on radar imagery using imagery analysis and GIS software. The Radar image analysis guideline is revised when necessary.

4) Detailed programme implemented in the fourth year (from April 2016 to March 2017)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Forest-cover Maps by new forest definition for Gaza and Cabo Delgado Provinces	RS-TWG members DIRF officers	● To discuss about the revised classification results for the forest-cover maps.	August and February (2 days)	Discussion	Maputo	M. Kawai	RS-TWG members and DIRF officers understand how to improve the forest-cover maps by new forest definition.
Forest-cover Maps for Reference Years	RS-TWG members	● To discuss about a revised method for the development of forest-cover maps of reference years.	June (1 days)	OJT	Maputo	T. Nakanishi	RS-TWG members understand the revised method to develop forest-cover maps for reference years.
Radar Imagery Analysis	DIRF officers	● To detect deforestation areas for GBFM GT survey using ALOS-2 radar imagery.	August and November (2-3 days)	OJT	Maputo	M. Kawai	DIRF officers understand how to detect deforestation area from ALOS-2 imagery.

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
	DIRF officers RS-TWG members	● To understand how to find deforestation areas on radar imagery. ● To detect the deforestation areas using ALOS-2 radar imagery and summarize the work flow to the manual.	February (1 week)	Lecture and Exercise	Maputo	M. Kawai	DIRF officers and RS-TWG members understand how to find deforestation areas on radar imagery using imagery analysis and GIS software. DIRF officers and RS-TWG members summarize the work flow to the manual themselves.

5) Detailed programme implemented in the fifth year (from April 2017 to March 2018)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Forest-cover Maps for Reference Years	DIRF officers (Mr. Pachis Mugas and Mr. Obasanjo Dembele)	● To examine satellite imagery and conduct data processing and analysis, including change detection and classification. ● To understand the entire workflow of the development of forest-cover maps for reference years.	July (1 week)	Lecture and Exercise	Tokyo, Japan	T. Nakanishi	DIRF officers understand how to conduct data processing and change detection and develop forest cover maps using optical satellite imagery. DIRF officers understand the entire workflow of the development of forest-cover maps for reference years.
	DIRF officers and staff of MRV unit in UT-REDD+ (Two from DIRF and four from UT-REDD+)	● To reexamine satellite imagery and repeat the data processing and analysis. ● To transfer the acquired skills from the DIRF officers who participate in the training in Japan to the other officers.	August (Seven days)	Lecture and Exercise	Maputo	T. Nakanishi	DIRF officers further improve their skills for data processing and change detection and development of forest cover maps using optical satellite imagery.

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
							The acquired skills and knowledge are understood by DIRF officers who do not participate in the training in Japan.
Radar Imagery Analysis	DIRF officers (Mr. Pachis Mugas and Mr. Obasanjo Dembele)	● To understand how to detect deforestation areas automatically. ● To summarize the work flow and results in the radar image analysis Guideline.	July (1 week)	Lecture and Exercise	Tokyo, Japan	M. Kawai	DIRF officers understand how to detect deforestation areas on radar imagery using imagery analysis and GIS software. The radar image analysis guideline was revised.
Quasi-real-time deforestation monitoring	DINAF and DIRF officers and chief from each province's SPF	● To explain the method of quasi-real-time deforestation monitoring. ● To exchange opinions so that the method can be utilized by the central government and each province.	February (1 day)	Workshop	Maputo	M. Kawai	Participants understand the method of quasi-real-time deforestation monitoring. Based on opinions from the participants, options for utilizing the results of the quasi-real-time deforestation monitoring were organized.

5) Detailed programme implemented in the fifth year (from April 2017 to March 2018)

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Forest-cover Maps for Reference Years	DIRF officers (Mr. Pachis Mugas and Mr. Obasanjo Dembele)	● To examine satellite imagery and conduct data processing and analysis, including change detection and classification. ● To understand the entire workflow of the development of forest-cover maps for reference years.	July (1 week)	Lecture and Exercise	Tokyo, Japan	T. Nakanishi	DIRF officers understand how to conduct data processing and change detection and develop forest cover maps using optical satellite imagery. DIRF officers understand the entire workflow of the development of forest-cover maps for reference years.
	DIRF officers and staff of MRV unit in UT-REDD+ (Two from DIRF and four from UT-REDD+)	● To reexamine satellite imagery and repeat the data processing and analysis. ● To transfer the acquired skills from the DIRF officers who participate in the training in Japan to the other officers.	August (Seven days)	Lecture and Exercise	Maputo	T. Nakanishi	DIRF officers further improve their skills for data processing and change detection and development of forest cover maps using optical satellite imagery. The acquired skills and knowledge are understood by DIRF officers who do not participate in the training in Japan.
Radar Imagery Analysis	DIRF officers (Mr. Pachis Mugas and Mr. Obasanjo Dembele)	● To understand how to detect deforestation areas automatically. ● To summarize the work flow and results in the radar image analysis Guideline.	July (1 week)	Lecture and Exercise	Tokyo, Japan	M. Kawai	DIRF officers understand how to detect deforestation areas on radar imagery using imagery analysis and GIS software. The radar image analysis guideline was revised.

Title	Participants	Contents	Time/Duration	Method	Venue	Trainer	Achievement goal
Quasi-real-time deforestation monitoring	DINAF and DIRF officers and chief from each province's SPF	● To explain the method of quasi-real-time deforestation monitoring. ● To exchange opinions so that the method can be utilized by the central government and each province.	February (1 day)	Workshop	Maputo	M. Kawai	Participants understand the method of quasi-real-time deforestation monitoring. Based on opinions from the participants, options for utilizing the results of the quasi-real-time deforestation monitoring were organized.

2.3 Forest Inventory Field

2.3.1 Concepts and Targets

1) Concept of capacity development in forest inventory field

The project aims to improve the capacity of technology and operation on forest inventory concerning MRV of “sustainable forest resource information platform”. The project also aims to develop human resources for QA/QC of forest inventory after the end of the project. With this view the project conducts activities such as training, OJT and technology dissemination seminar.

2) Level before capacity building and target level of trainees

Although some technical staffs of each Province who are assumed to be trainees of the Project have basic skill on forest inventory, the skill on the latest instruments that are supposed to be used in the Project and on the data analysis seemed to be insufficient. The Project targets on acquirement of capacity to conduct QA/QC of forest inventory as well as to use latest measurement instrument in accordance with purpose with the basis of understanding of characteristics and accuracy of latest instruments.

2.3.2 Program

1) Detailed programme implemented in the first year (from April 2013 to March 2014)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Operation of the activity on forest inventory	Technical staff of DNRI	● Discussing contents of the forest inventory training ● Designing Implementation method of pre-inventory	June 2013, November 2013	OJT through the Technical Working Group Meeting	DNRI	-Kajigaki, -Morikawa, -Fukuchi	To support the activities of the project for smooth execution through discussion about problem of the project, consensus-building and action to the parties concerned
Forest inventory training	Technical staff of DNRI and SPFFB	● Outline of the forest inventory ● Usage of GPS, PDA and tablet computer	October 2013 (2 days)	Off-JT: lecture and exercise	Maputo	-Kajigaki, -Morikawa, -Fukuchi	To understand outline of the forest inventory and usage of GPS, PDA and tablet computer
		● Measuring method of distance, bearing, tree height, DBH ● Sample plot setting	October 2013 (4 days)	Off-JT: field training	Maputo, Namaacha	-Kajigaki, -Morikawa, -Fukuchi	To set sample plot using digital/analog instruments To measure tree height and DBH and to record the survey data using digital/analog instruments
		● Estimation of forest carbon stock ● Presentation/Discussion	October 2013 (2 days)	Off-JT: lecture, exercise	Maputo	-Kajigaki, -Morikawa, -Fukuchi	-To understand the method of estimation of forest carbon stock -To report the survey results using digital/analog instruments

2) Detailed programme implemented in the second year (from April 2014 to March 2015)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Operation of the activity on forest inventory	Member of the TWG on forest inventory	● Designing forest inventory survey method and technical guideline	July 2014 February 2015	OJT through the TWG	DNRI	- Kajigaki - Sato - Fukuchi	To support the activities of the project for smooth execution through discussion, consensus-building and action to the parties concerned

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Forest inventory training	Technical staff of DNRI and SPFFB	● Outline of the forest inventory ● Usage of GPS, PDA and tablet computer	June 2014 (5 days)	Off-JT: lecture and exercise	Maputo	-Kajigaki, -Morikawa, -Fukuchi	To understand outline of the forest inventory and usage of GPS, PDA and tablet computer
		● Measuring method of distance, bearing, tree height, DBH ● Sample plot setting	June 2014 (3 days)	Off-JT: field training	Namaacha	-Kajigaki, -Morikawa, -Fukuchi	To set sample plot using digital/analog instruments To measure tree height and DBH and to record the survey data using digital/analog instruments
		● Estimation of forest carbon stock ● Presentation/Discussion	June-July 2014 (3 days)	Off-JT: lecture, exercise	Maputo	-Kajigaki, -Morikawa, -Fukuchi	-To understand the method of estimation of forest carbon stock -To report the survey results using digital/analog instruments
Pre-inventory	Technical staff of DNRI and SPFFB of Southern area	● Field survey in Gaza province	August-September 2014 (12 days)	OJT	Manjacaze, Combomune, Massingir, Dindiza	-Kajigaki, -Fukuchi	-To implement forest inventory using cluster sampling method in several forest types
	Technical staff of DNRI and SPFFB of Northern area	● Field survey in Cabo Delgado province	September 2014 (15 days)	OJT	Mueda, Pemba, Mecufi	-Kajigaki, -Fukuchi	

3) Detailed programme implemented in the third year (from April 2015 to March 2016)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Operation of the activity on forest inventory	Technical staff of DNRI	● Management of forest inventory survey by sub-contractor	June 2015 February 2016	OJT	Maputo	- Kajigaki - Fukuchi	To instruct and supervise sub-contractor in accordance with TOR.
Forest inventory training	Technical staff of DNRI and	● Method of QA/QC ● Usage of equipment	October 2015 (1 day)	Off-JT: lecture and exercise	Limpopo national park	-Kajigaki, -Fukuchi	To understand outline of QA/QC and usage of equipment.

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
	SPFFB of southern area	● Plot setting ● Tree mensuration	October 2015 (2 days)	Off-JT: field training	Limpopo national park	-Kajigaki, -Fukuchi	To understand check points of plot setting and tree mensuration.
		● Analysis	October 2015 (1 day)	Off-JT: exercise	Limpopo national park	-Kajigaki, -Fukuchi	To understand method of analysis for QA/QC.
		● Tentative QA/QC	October 2015 (4 days)	Off-JT: field training	Limpopo national park	-Kajigaki, -Fukuchi	To understand the method of QA/QC.

4) Detailed programme implemented in the fourth year (from April 2016 to March 2017)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Operation of the activity on forest inventory	Technical staff of DNRI	● Management of forest inventory survey by sub-contractor	May 2016 February 2017	OJT	Maputo, Cabo Delgado	Kajigaki	To instruct and supervise sub-contractor in accordance with TOR.
Forest inventory training for QA/QC	Technical staff of DNRI and SPFFB of northern area	● Method of QA/QC ● Usage of equipment	August 2016 (1 day)	Off-JT: lecture and practice	Quirimbas national park	Kajigaki	To understand outline of QA/QC and usage of equipment.
		● Plot setting ● Tree mensuration	August 2016 (2 days)	Off-JT: field training	Quirimbas national park	Kajigaki	To understand check points of plot setting and tree mensuration.
		● Analysis	August 2016 (1 day)	Off-JT: practice	Quirimbas national park	Kajigaki	To understand method of analysis for QA/QC.
		● Tentative QA/QC	August 2015 (4 days)	Off-JT: field training and indoor work	Quirimbas national park	Kajigaki	To understand the method of QA/QC.

5) Detailed programme implemented in the 5th year (from April 2017 to March 2018)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal

Revision of forest inventory guideline	Technical staff of DNRI	● Intelligible guideline	May-June 2017	OJT	Maputo	Kajigaki	To understand how to describe intelligible guideline
Analysis of the results of forest inventory	Technical staff of DNRI	● How to analyze forest inventory data	May-June 2017	OJT	Maputo	Kajigaki, Shimaoka	To understand how to analyze forest inventory data

2.4 Ground-Based Forest Monitoring Field

2.4.1 Concepts and Targets

The ground-based forest monitoring (GBFM) is the system that monitors and identifies the scale, frequency and cause of deforestation and forest degradation by satellite detection and field patrol. And it contributes to the effective implementation of REDD+ activity.

The methodology of GBFM was designed based on the following three frameworks for first and second year,

1) Real-time monitoring for forest fires
   The first framework is the system to conduct monitoring of forest fire area in real time when forest fires occur in the target community.

2) Three months later monitoring for check of deforestation
   The second framework is the system to conduct monitoring of the area called the “burned area” in which vegetation loss is expected due to forest fire, etc. by the analysis of MODIS satellite imagery and to conduct re-monitoring of the forest fire sites monitored in real time. Since the burned area data by MODIS are provided about three months later from the timing when vegetation loss is detected through the analysis of MODIS, the monitoring is conducted after three months from the timing when a forest fire occurs.

3) Real-time monitoring for charcoal producers
   The third framework is a system to conduct monitoring of the number of charcoal producers in real time when charcoal production is detected in the target community.

The monitoring was conducted in the integrated form of the three frameworks. The concept of the monitoring system in which the three frameworks are integrated is illustrated in the following figure.

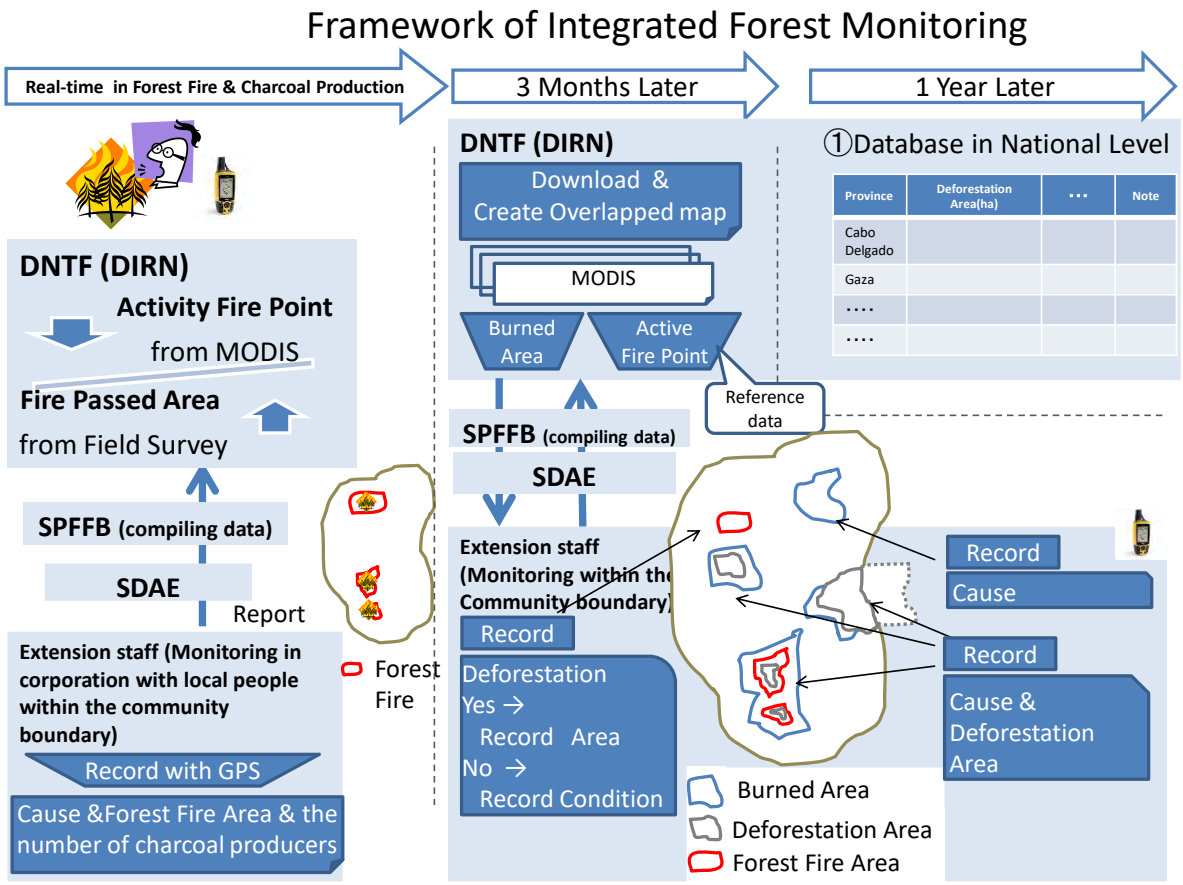

Figure 2.1 Concept figure of the monitoring system in which the three frameworks are integrated

Based on the this system, the target persons of capacity building are 1) an extension staff member or an assistant technician (hereinafter referred as “the extension staff”) who is in charge of a target community and play role of implementation of the GBFM in corporation with local people in the community and 2) the staff of SPFFB and/or SDAE who is responsible for supervision and guiding of the monitoring systems and transmission of the information on the sites through MODIS image to the extension staff, and deforestation and forest degradation to be reported by the extension staff to the central government.

The extension staff don't have the experience of the monitoring about deforestation and forest degradation. Therefore, capacity building for implementation structure of monitoring system, role of the extension staff, method of actual activities and how to summarize the information should be promoted through workshops and trainings for them. Regarding to the local government staff, the capacity building for the method of monitoring, supervision techniques to enable the extension staff to implement the monitoring, and the sorting outs and transmission method of the monitoring results should be promoted through trainings, workshops and OJT.

In the technology transfer plan for the second year, the implementation of the capacity building for the both parties of the extension staff and local governmental officers such as SPFFB and SDAE staff was planned and implemented.

The Project implemented the GBFM in the second year according to the methodology mentioned above. Analyzing the results, however, it was found that forest fires were not causing deforestation and area deforested by the BA was little. Consequently, the GBFM by method taken in 2nd year has become less important for identifying deforestation. In addition, as descried in the section 1.3 (8) of the Interim Report,

the established management system did not work properly in either the central level or the provincial level. Moreover, involvement of many levels including the central, provincial, district and pilot community levels made it difficult to ensure appropriate communication between the different levels in order to share the same information. Taking such situation into consideration, it became apparent that reconsideration of the methodology be necessary in order to disseminate the GBFM to other areas.

On the other hand, the JCC held on 12th May 2015 agreed that deforestation monitoring at the semi-real-time would be implemented by use of analysis of radar satellite image. Based on the agreement, it will be planned in the future that deforestation area is detected by the radar analysis in about one year interval and the detection is utilized for deforestation countermeasures. Considering those, to detect deforestation area by the radar analysis in the some pilot districts and to check the detection on the ground has been implemented on trial as the GBFM by initiative of the central government in the project period. In addition, the Project temporally developed the utilization of results of deforestation monitoring at the semi-real-time, e.g. analysis of cause by area size of deforestation, identification of place where much deforestation occur, countermeasures for deforestation through identification analysis of hot-spots area of deforestation, identification of forest types and/or topography etc. which are likely to deforest, contribution to monitoring and/or patrol to be needed especially in the existing conservation areas.

Based on the revised methodology, concepts and targets of technology transfer for the implementation of GBFM is as follows. Since the counterpart personnel of the central government (DNRI) which is target for the technology transfer is familiar with GPS operation and ground-truth for satellite imagery analysis, it is not so necessary to provide training on that subject. Moreover, the Japanese experts have accompanied the counterpart personnel of DIRF to implement the GBFM in the field. Therefore, methodology of the GBFM has been learned along with the OJT in the field.

2.4.2 Program

1) Detailed programme implemented in the first year (from April 2013 to March 2014)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Concept and methodology of GBFM	Member of TWG on the GBFM	● Confirming what the Project would like to measure through the forest monitoring ● Consideration of feasible and sustainable methods of forest monitoring	October, November, January and February	OJT in the TWG	Maputo	Kato, Toyoda, Fukuchi	The participants get concept of GBFM in shape and propose the methodology of GBFM
Consideration for utilization of MODIS imagery	Member of TWG on forest monitoring	● Consideration of method of utilization of MODIS imagery including transmission systems of the imagery from central level to local levels	October, November, February	OJT in the TWG	Maputo	Kato, Kawai	The participants organize the method of utilization of MODIS imagery
Sharing and discussing the methodology of the forest monitoring and selection of model areas	Staff of DIRN, SPFFBs in Cabo Delgado and Gaza provinces, and SDAEs of pilot districts in the both provinces	● Explanation and consideration of methods for the monitoring (methods of checking sites where forest fires break out and vegetation loss is expected through MODIS image in order to seek the cause of deforestation and forest degradation, method of measurement of areas, etc.) ● Discussion and decision of the 1) candidate model area, 2) actual implementer and supervisor of the monitoring, 3) role of the implementer and supervisor, 4) schedule of monitoring activities	February	Discussion with SPFFB and SDAE	Office of the SPFFB and SDAEs	Kato Fukuchi	Participants understand the methodology of the monitoring
	Staff of DIRN, the SPFFB and the SDAE, and local people in	● Explanation of the contents of monitoring activities to the local people ● Confirmation of agreement as model communities	February	Discussion with local communities	Candidate site	Kato Fukuchi	The local people understand that their community is model area for the monitoring

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
	the pilot communities						

2) Detailed programme implemented in the second year (from April 2014 to March 2015)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Ground Data Collection using GPS	8 persons (2 persons/district (SDAE) x 2 districts (pilot districts in Cabo Delgado and Gaza provinces) x 2 provinces)	●GPS basic operations, area calculations, GPS data transfer, and fieldwork are included. ●Recording technique for ground data to detect driving factors of deforestation	Training: May (3 days in Cabo Delgado) and June (3 days in Gaza) Follow up: July (4 days in Cabo Delgado and 3 days in Gaza)	Training, Follow-up training,	Each one pilot district in Cabo Delgado and Gaza Provinces	Morikawa Kato, Issac Danilo Mugas	The participants acquire necessary GPS skills and data recording techniques for implementation of forest monitoring. The trainees were expected to be a trainer in each district.
GIS operation	4 persons (2 persons/province (SPFFB) x 2 provinces (Cabo delgado and Gaza provinces))	●Application of basic operation and introductory level (Necessary contents for monitoring are selected from "ArcGIS desktop 1 & 2 courses" which is a teaching materials provided by ESRI Co.) ●A repeat exercise for necessary items of GIS operation for implementation of GBFM	June (5days)	Training	Maputo	contracted trainer	The participants acquire necessary GIS skills for implementation of forest monitoring. The trainees were expected to be a trainer in each province.
Identification of monitoring area for MODIS burned area in the pilot community	SDAEs (including the extension staff) of the pilot districts in Cabo Delgado and Gaza provinces, and local people in the pilot communities	●Explanation of the method of identification of the monitoring area ●Identification of the monitoring area	Training: May (3 days in Cabo Delgado) and June (3 days in Gaza) OJT: June and July	Training, OJT	The pilot communities	Issac Danilo Morikawa Kato	The extension staff understand the method of the identification of the monitoring area

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Methods of the GBFM	8 persons (2 persons/district (SDAE) x 2 districts (pilot districts in Cabo Delgado and Gaza provinces) x 2 provinces)	●Recording ground data to detect driving factors of forest fire and/or deforestation ●Recording condition of the monitoring area where forest fire and/or deforestation occurred ●Measurement way of area of forest fire and /or deforestation by GPS ●How to fill in the field note, based on the manual developed by the Project.	Training: May (3 days in Cabo Delgado) and June (3 days in Gaza) Follow up: July (4 days in Cabo Delgado and 3 days in Gaza) OJT: August (5 days in Cabo Delgado), September (3 days in Gaza), November (3 days in Gaza), December (5 days in Cabo Delgado)	OJT	The field of the pilot communities	Morikawa Kato, Issac Danilo Mugas	Participants acquire skills on methods of 1) Real-time monitoring (RTM) for forest fires, 2) Three months later monitoring of RTM and MODIS burned area monitoring, and 3) monitoring for charcoal producers, which are set for GBFM
	SPFFBs in Cabo Delgado and Gaza provinces	●Confirmation of method for the supervision of the GBFM ●Sorting out the data of the monitoring result by GIS, and method of the data transmission.	From May to July, From January to February	OJT	Offices in the SPFFBs		Participants master the management methods of the GBFM and recording method of the results of GBFM
Detailed management method of the GBFM	Member of TWG on the GBFM	●How to prepare field note (sorting out sheet) of monitoring ●Method of Implementation and follow-up of GPS, GBFM, and GIS training ●How to identify monitoring area for MODIS burned area in the pilot community ●How to establish GBFM management system	May and August	OJT in the TWG	Maputo	Team leader (Kato)	The participants create the detailed method of the forest monitoring.

3) Detailed programme implemented in the third year (from April 2015 to March 2016)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Implementation of GBFM	Member of TWG on forest monitoring	● Method GT survey to collect training data for radar image analysis as GBFM in this year ● method to collect information on cause of deforestation	June (3 days in Cabo Delgado), August (2 days in Cabo Delgado), September (3 days in Zambezia), October (2 days in Gaza), November (2 days in Gaza), December (4 days in Cabo Delgado), December (3 days in Manica)	OJT	Rader image analyzed area selected	Kawai Morikawa Kato Toyoda	The participants master the method of GBFM in this year
Information sharing of results of GBFM	Member of TWG on forest monitoring	● Sharing results of GBFM implemented ● Consideration of GBFM in forth year	March	OJT in the TWG	Maputo	Kawai Kato	The participants understand the method and results of GBFM in this year

4) Detailed programme implemented in the fourth year (from April 2016 to March 2017)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Implementation of GBFM	Member of TWG on forest monitoring	● Method GT survey to collect training data for radar image analysis as GBFM in this year ● method to collect information on cause of deforestation	August (one week, two times)	OJT	Inhambane prov. and Niassa prov	Kawai Morikawa	The participants master the method of GBFM in this year
Information sharing of results of GBFM	Participants of the annual report workshop	● Sharing results of GBFM implemented	February (one day)	Workshop	Maputo	Kawai Morikawa	The participants understand the method, results of GBFM in this year

2.5 REL/RL Field

2.5.1 Concept and Target

Regarding development of FRELs/FRLs and their related methods, the following procedure was adopted.

- ✧ Information on FRELs/FRLs developed in the past and methods of developing them as well as the natural and socio-economic conditions of Mozambique are collected and analyzed. Moreover, information necessary to consider national circumstances to adjust FRELs/FRLs is collected and analyzed.
- ✧ Methods of developing FRELs/FRLs to be applied in the Project are examined and various features of FRELs/FRLs (e.g. REDD+ activities to be included, carbon pools to be included) are decided, on the basis of analyzing the relevant information collected. Whether national circumstances should be considered to adjust FRELs/FRLs is also examined, analyzing available data (e.g. deforestation causes, population density) and how these data can be applied to adjust FRELs/FRLs. Furthermore, taking into account results of technical assessments of FRELs/FRLs submitted to UNFCCC, possibility of the approach chosen to adjust the FRELs/FRLs is examined.
- ✧ Forest carbon stocks at certain time points in the past are estimated and the historical trends in their emissions and removals are analyzed on the basis of the activity data and emission factors developed for each forest and land-use type by analyzing the satellite images and using inventory and biomass/carbon stock data.
- ✧ FRELs/FRLs are developed, applying the method of estimating future forest carbon stocks and their emissions/removals and deciding whether national circumstances are considered to adjust FRELs/FRLs.

The method of developing FRELs/FRLs has been established through the development of FRELs/FRLs following the above mentioned procedure. In this procedure, the capacity development for C/P personnel and other related persons has been executed through sharing information on the process of the development, technical issues to be overcome and the method of developing FRELs/FRLs established with the related persons in seminars, and establishing the method of developing FRELs/FRLs with the C/P personnel by the OJT utilizing the Technical Working Group for the FRELs/FRLs.

Method of developing FRELs/FRLs adopted a feedback system of reflecting the findings obtained through the process of developing FRELs/FRLs mentioned above in the manual for estimation methods.

With respect to the target of the capacity development for the FRELs/FRLs development, related governmental officers, researchers in universities and staff of donors as well as C/P personnel in DINAF have been the targets for the seminars mentioned above. Since the ability and knowledge level of the target persons are different, it is difficult to set target level for the achievement, but it was a target for the persons to understand at least the method of FRELs/FRLs estimation.

On the other hand, regarding the OJT through the Technical Working Group for the FRELs/FRLs, the target has been the members of the Technical Working Group. The targets for the achievement are 1) to sufficiently understand method of FRELs/FRLs development, 2) to enable them to estimate FRELs/FRLs and modify the FRELs/FRLs developed in the Project.

2.5.2 Program

1) Detailed programme implemented in the first year (from April 2013 to March 2014)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Preparations for FRELs/FRLs seminar	FRELs/FRLs-TWG members	● Preparing the seminar to be organized in 2nd year to share basic knowledge concerning FRELs/FRLs.	February to March (2 days)	OJT in TWG	Maputo	H. Chiba; K. Kato	The participants can prepare logistic issues as well as contents for the seminar.
Collection and analysis of existing information on FRELs/FRLs	FRELs/FRLs-TWG members	● Collecting existing information on FRELs/FRLs ● Considering estimation method of FRELs/FRLs through analysis of existing information on FRELs/FRLs ● Considering procedure to follow in order to estimate FRELs/FRLs in Mozambique ● Considering which information is available and which information needs collecting in order to estimate FRELs/FRLs	February to March (2 days)	OJT in TWG	Maputo	H. Chiba; K. Kato	The participants understand method and procedure of estimating FRELs/FRLs and recognize various points to be considered in order to estimate FRELs/FRLs.

2) Detailed programme implemented in the second year (from April 2014 to March 2015)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Preparations for FRELs/FRLs seminar	FRELs/FRLs-TWG members	● Preparing the seminar to share basic knowledge concerning FRELs/FRLs (continuing from 1st year).	September, February (5 days)	OJT in TWG with assignment	Maputo	H. Chiba	The participants can prepare logistic issues as well as contents for the seminar.
FRELs/FRLs seminar	DNTF and relevant administrative personnel in central level, researchers of universities, etc.	● Explaining concept of FRELs/FRLs ● Explaining technical matters on setting FRELs/FRLs	February (1 day)	Seminar	Maputo	H. Chiba, experts of AFD Project	The participants understand concept and technical aspects of setting FRELs/FRLs and acknowledge what

		● Discussing how FRELs/FRLs should be developed in Mozambique					should be considered for setting FRELs/FRLs.
Analysis of FRELs/FRLs designed in the past and study of FRELs/FRLs estimation methods	FRELs/FRLs-TWG members	● Collecting/analyzing FRELs/FRLs designed in the past ● Studying method of setting FRELs/FRLs to be applied in the Project	February (2 days)	OJT in TWG	Maputo	H. Chiba	The participants understand various methods to set FRELs/FRLs.

3) Detailed programme implemented in the third year (from April 2015 to March 2016)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Collection and analysis of information for designing FRELs/FRLs methods	FRELs/FRLs-TWG members	● Collecting/analyzing FRELs/FRLs designed in the past (continuing from 2nd year) ● Studying method of setting FRELs/FRLs to be applied in the Project (continuing from 2nd year)	August, September and October (5 days)	OJT in TWG	Maputo	H. Chiba	The participants understand various methods to set FRELs/FRLs and advantages/ disadvantages of each to be applied in Mozambique.
Consideration of reference period and the number of data points for FRELs/FRLs	FRELs/FRLs-TWG members	● Collecting/analyzing information of guidelines set by various approaches for developing FRELs/FRLs ● Considering and deciding which approach(es) should be followed for developing FRELs/FRLs ● Considering how the reference period and the number of data points should be set in order to conform to the approach(es) to be followed	August, September, October and February (5 days)	OJT in TWG	Maputo	H. Chiba	The participants understand various rules set on the reference period by different approaches and are able to consider which approach(es) should be appropriate for the Project, taking into account conditions of Mozambique.

4) Detailed programme implemented in the fourth year (from April 2016 to March 2017)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Consideration of various features of FRELs/FRLs	FRELs/FRLs-TWG members	● Collecting/analyzing FRELs/FRLs designed in the past and results of technical assessments of the FRELs/FRLs (continuing from 3rd year) ● Examining various methods of setting FRELs/FRLs ● Identifying methodological options of setting FRELs/FRLs to be applied in the Project	October, November and February (5 days)	OJT through discussions with TWG members	Maputo	H. Chiba	The participants are able to analyze various methods of setting FRELs/FRLs in association with conditions of Mozambique and identify the most suitable one.
Consideration of adjusting FRELs/FRLs by national circumstances	FRELs/FRLs-TWG members	● Collecting/analyzing data that can be used to project forest conditions in the future ● Examining how the future projection can be justified with given data and possibility of having the adjustment of FRELs/FRLs by national circumstances accepted by technical assessment under UNFCCC ● Examining how the national circumstances should be treated for FRELs/FRLs of the Project	October, November and February (5 days)	OJT through discussions with TWG members	Maputo	H. Chiba	The participants understand advantages and disadvantages of considering national circumstances and how the national circumstances should be treated in given conditions.

5) Detailed programme implemented in the fifth year (from April 2017 to March 2018)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Developing FRELs/FRLs	FRELs/FRLs-TWG members	● Making decisions on various features of FRELs/FRLs based on all the data collected throughout the Project implementation ● Analyzing the historical trend of emissions/removals based on the forest cover maps and results of forest inventories ● Considering various options of setting FRELs/FRLs (projecting future emissions) and making a decision on the method to be applied in the Project ● Making decisions on whether FRELs/FRLs are adjusted by national circumstances	June, July, August, September (5 days)	OJT through discussions with TWG members	Maputo	H. Chiba	The participants understand various features of FRELs/FRLs that need to be defined and are able to develop FRELs/FRLs, applying a historical average method.
Preparing a manual of developing FRELs/FRLs	FRELs/FRLs-TWG members	● Compiling the entire procedure followed to develop FRELs/FRLs ● Reflecting the findings obtained throughout the process of developing FRELs/FRLs in the manual of developing FRELs/FRLs	June, July, August, September (5 days)	OJT through discussions with TWG members	Maputo	H. Chiba	The participants understand the entire procedure of developing FRELs/FRLs.

2.6 Biomass and Carbon Estimation Field

2.6.1 Concept and Target

Biomass and carbon stock estimation has been conducted to mainly estimate the carbon stocks in the Above Ground Biomass (AGB) and the Below Ground Biomass (GBG) of each forest type classified by the forest cover maps. For this purpose, allometric equations that were obtained through searching relevant scientific documents, carrying out a biomass survey and the IPCC guidelines were applied in combination with the plot data obtained from forest inventory surveys.

Information and data on the process of field survey, laboratory work and analysis of the survey result, and technical issues on the biomass survey have been shared with the related persons through the implementation of the biomass survey and the seminars. In addition, the biomass and carbon stock estimation have been conducted with C/P personnel and other related persons by the OJT utilizing the Technical Working Group for the biomass and carbon estimation. The capacity development for the C/P personnel and other related persons has been conducted through the above mentioned process and method.

With respect to the target of the capacity development for the biomass and carbon stock estimation, persons in charge in the SPFFBs/SPFs and other related governmental officers, researchers in universities and staff of donors as well as C/P personnel in DINAF have been the targets for the seminars and the biomass survey mentioned above. Since the ability and knowledge level of the target persons were different, it was difficult to set a target level for the achievement, but it was a target for the persons to understand at least the method of biomass and carbon stock estimation.

In addition, the target for the achievement on the biomass survey is that C/P personnel in DINAF and other related personnel understand method of biomass survey through the implementation.

On the other hand, regarding the OJT through the Technical Working Group for the biomass and carbon estimation, the target has been the members of the Technical Working Group. The targets for the achievement are 1) to enable them to analyze the existing data and make a decision on whether the biomass survey needs to be implemented, 2) to understand method of biomass and carbon stock estimation by using related data, 3) to enable them to conduct biomass and carbon stock estimation and revise the result of biomass and carbon stock estimation made by the Project.

2.6.2 Program

1) Detailed programme implemented in the first year (from April 2013 to March 2014)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Preparations for seminar on biomass and carbon estimation	Biomass-TWG members	● Preparing the seminar to be organized in 2nd year to share basic knowledge concerning biomass and carbon estimation.	February to March (2 days)	OJT in TWG	Maputo	H. Chiba, K. Kato	The participants can prepare logistic issues as well as contents for the seminar
Collection and analysis of existing information on biomass and carbon estimation	Biomass-TWG members	● Collecting existing information on biomass and carbon estimation ● Considering method of biomass and carbon estimation through analysis of existing information on biomass and carbon estimation	February to March (2 days)	OJT in TWG	Maputo	H. Chiba, K. Kato	The participants understand the method of biomass and carbon estimation by other projects etc. in the past.

2) Detailed programme implemented in the second year (from April 2014 to March 2015)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Preparations for seminar on biomass and carbon estimation	Biomass-TWG members	● Preparing the seminar to share basic knowledge concerning biomass and carbon estimation (continuing from 1st year).	June (3 days)	OJT in TWG	Maputo	H. Chiba; A. Sato	The participants can prepare logistic issues as well as contents for the seminar
Seminar on biomass and carbon estimation	DNTF and relevant administrative personnel in central level; SPFFB staff, researchers of universities, etc.	● Explaining how carbon data will be used for REDD+ ● Explaining method and procedure of estimating carbon stock	July (1 day)	Seminar	Maputo	H. Chiba; A. Sato	The participants understand method and procedure of estimating carbon stock and how to apply the obtained data to REDD+.

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
	DNRI officers, SPFFB staff	● Practice of calculating carbon stock through calculating co-efficient and formulas based on given sample data	July (1 day)	Seminar (Exercise)	Maputo	A. Sato	The participants learn how to calculate carbon stock using given co-efficient and formulas.
Development of method on biomass and carbon estimation	Biomass TWG members	● Collecting and analyzing the biomass and carbon data (e.g. allometric equations) developed in the past ● Studying options of using the Tier 1 data ● Studying whether additional biomass survey will be implemented ● Clarifying method of biomass and carbon estimation including the method of biomass survey	July (2 days)	OJT in TWG with assignment	Maputo	H. Chiba; A. Sato	The participants will be able to analyze how to arrange the carbon data (carbon data can be arranged by the existing data only or the additional survey is needed) taking into account all the information available to them.

3) Detailed programme implemented in the third year (from April 2015 to March 2016)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Updating status of arrangement of the data necessary for carbon estimation	Biomass-TWG members	● Collecting/analyzing the information on allometric equations newly developed within the country ●	October, and February (3 days)	OJT in TWG	Maputo	H. Chiba	The participants will understand the situation of arrangement of allometric equations in Mozambique.
Consideration of implementing a biomass survey	Biomass-TWG members	● Considering whether a biomass survey should be implemented by the Project taking into account the situation of biomass data	October, February and March (10 days)	OJT in TWG and a field survey	Maputo, Gaza	H. Chiba	The participants will be able to consider various options to fill the gap in data arrangement (e.g. implementing a biomass

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
		arrangement in Mozambique Project ● Preparing for a biomass survey if it is decided to implement a biomass survey					survey for developing allometric equations).

4) Detailed programme implemented in the fourth year (from April 2016 to March 2017)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Conducting a biomass survey and developing allometric equations	Biomass-TWG members, SPFFB personnel of 10 provinces	● Preparing technical and logistical matters of the biomass survey ● Collecting data in the field measurement ● Collecting data in the laboratory measurement ● Examining the collected data and developing allometric equations	June and July (20 days)	OJT in the field and laboratory	Maputo	H. Chiba, S. Fujimura	The participants are able to conduct biomass surveys (or supervise biomass surveys) and analyze the data collected in the biomass survey to develop allometric equations.
Reviewing the biomass and carbon estimation model	Biomass-TWG members	● Reviewing the biomass and carbon estimation model developed in the 2nd year (continuing from 3rd year) ● Examining validity of including the soil organic carbon as one of the carbon pools based on analysis of the soil survey data developed by AFD and other projects (continuing from 3rd year) ● Reviewing the biomass survey in comparison with	October, November and February (5 days)	OJT through discussions with TWG members	Maputo	H. Chiba	The participants are able to analyze given data and identify an appropriate method for Mozambique to estimate biomass and carbon stocks.

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
		● the biomass and carbon estimation model developed in the 2nd year ●					

5) Detailed programme implemented in the fifth year (from April 2017 to March 2018)

Title	Participants	Contents	Time/ Duration	Method	Venue	Trainer	Achievement goal
Searching updated data regarding biomass and carbon estimation	Biomass-TWG members	● Collecting/analyzing the information on allometric equations newly developed within the country (continuing from the 3rd year) ● Examining applicability of the found allometric equations to development of emission factors for Mozambique	June, July, August, September (5 days)	OJT through discussions with TWG members	Maputo	H. Chiba	The participants understand what types of allometric equations are applied for estimating biomass of each forest type and tree species in Mozambique.
Revising the biomass and carbon estimation model developed in the 2nd year	Biomass-TWG members	● Incorporating findings of the biomass survey acquired data into the biomass and carbon estimation model developed in the 2nd year ● Incorporating newly acquired data into the biomass and carbon estimation model developed in the 2nd year	June, July, August, September (5 days)	OJT through discussions with TWG members	Maputo	H. Chiba	The participants have learned how to develop emission factors to be applied for estimating biomass and carbon stocks in Mozambique.