



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

FORFH402

FOREST HARVESTING

Conduct Forest Harvesting

Competence

RQF Level: 4

Learning Hours



80

Credits: 8

Sector: Agriculture and Food Processing

Trade: Forestry

Module Type: Specific

Curriculum: AFPPOR4002 - TVET Certificate 4 in Forestry

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Purpose statement	This module describes the skills, knowledge and attitude required to conduct forest harvesting. It is designed for learners who have successfully completed level III in Forestry and pursuing level IV in Forestry. At the end of this module, learners will be able to prepare for forest harvesting activities, perform forest harvesting and restore harvested areas. Qualified learners deemed competent may work in various places including open field, and a range of tasks related to forest harvesting. She/he can work alone or with others under minimum supervision.					
Delivery modality	Training delivery		100%	Assessment		Total 100%
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	• Group project and presentation	20%				
	• Individual project /Work	50%				
			Summative Assessment			50%

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Prepare for forest harvesting activities	1.1. Tree parameters are correctly measured in accordance with tree usage
	1.2. Forest harvesting permit is carefully applied for in accordance with forest laws and regulations
	1.3. Forest harvesting plan is properly elaborated in accordance with forest harvesting operations
2. Perform forest harvesting	2.1. Forest harvesting techniques are properly selected in accordance with issued permit
	2.2. Timber products are properly sorted according to their end use
	2.3. Timber products are properly stacked in accordance with their grades
	2.4. Timber products are properly transported according to available transportation means

3. Restore harvested areas	3.1. Forest restoration techniques are properly identified with reference to forest status
	3.2. Stumps are properly managed according to the forest age and species
	3.3. Antierosive ditches are properly established according to landscape
	3.4. Forest harvested area is properly tilled according to soil structure
	3.5. Reconversion/conversion is properly conducted according to landscape

Knowledge, Skills, and Attitude

Knowledge	Skills	Attitude
✓ Request Forest harvesting permit ✓ Elaborate forest harvesting plan ✓ Describe forest harvesting methods ✓ Describe forest restoration techniques ✓ Describe key components of forest landscape restoration ✓ Identify forest landscape restoration interventions ✓ Identify transportation means of timber products	✓ Measure tree parameters in forest harvesting ✓ Apply tree felling procedures ✓ Sort timber products ✓ Stack timber products ✓ Manage tree stumps ✓ Establish antierosive ditches ✓ Till forest harvested area ✓ Carry out forest reconversion/conversion activities	✓ Handle harvesting tools and equipment ✓ Respect hygiene and safety in working environment ✓ Manage the time ✓ Work with others and by your own ✓ Work under minimum supervision ✓ Be flexible

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Prepare for forest harvesting activities. 2. Perform forest harvesting. 3. Restore harvested areas
Learning outcome 1: Prepare for forest harvesting activities.	Learning hours: 20
Indicative content	
• Mensuration of tree parameters ✓ Height ✓ Diameter/ circumference ✓ Volume ✓ Basal area ✓ Stere • Requesting Forest harvesting permit or license ✓ Issue of license ✓ Conditions for apply for a license and content of the license ✓ Use of license ✓ Withdrawal of a license ✓ Forest clearing license ✓ State forest harvesting license ✓ District and private forests harvesting license • Planning of forest harvesting ✓ Recruitment ✓ Mapping of the forest or woodlots ✓ Estimation of the volume and grades of logs in the forest ✓ Resolution of any access issues ✓ Determination of the forest harvesting cost ✚ Methods of forest harvesting ✚ Tools and equipment ✚ Timeline ✚ Location ✓ Environmental impacts	
Resources required for the learning outcome	
Equipment	PPE, GPS, Laptop, Projector, screen projector

Materials	Paint, pegs, signal tape, Forest license template
Tools	Forest caliper, Diameter tape, Suunto clinometer, Haga, Relascope, Distance measuring tools (HAGLÖF Vertex, LTI TruPulse Laser, Vertex Laser Geo, DP GPS DME, Measuring tape, Walktax/topofil), slope corrector, scientific calculator, hammer, slasher, machetes, sickles, telescope pole, Blume Leiss
Facilitation techniques	Demonstration by viewing videos and films, simulation, Individual and group work, Practical exercise, Individualized, trainer guided and Group discussion, Oral presentation
Formative assessment methods	Written assessment, Oral assessment, Product assessment and Performance assessment

Learning outcome 2: Perform Forest harvesting.

Learning hours: 35

Indicative content

- Description of forest harvesting methods
 - ✓ Clear-cut method
 - ✓ Shelterwood
 - ✓ Seed tree
 - ✓ Group selection
 - ✓ Single tree selection
- Procedures of tree felling
 - ✓ Assess tree condition
 - ✓ Measurement of tree height
 - ✓ Prepare escape route
 - ✓ Marking of felling cuts
 - ✓ Execution of cuts
 - ✓ Delimbing or debranching
 - ✓ Bucking or crosscutting
- Sorting of timber products
 - ✓ Species
 - ✓ Quality
 - ✓ Size
 - ✓ End use
- Stacking of timber products
 - ✓ Grade
 - ✓ End use
 - ✓ Topography of land
- Transportation means of timber products
 - ✓ Land way transport

- ✓ Waterway transport
- ✓ Airway transport

Resources required for the indicative content

Equipment	PPE, GPS, Laptop, Projector, screen projector, tackles, tractor, skidders, forwarders, cable system (tackle, winch) Cable yarder, feller buncher, log loader, harvester, delimbers.
Materials	Paint, pegs, signal tape, steel cable.
Tools	Forest caliper, Diameter tape, Suunto clinometer, Haga, Relascope, Distance measuring tools (HAGLÖF Vertex, LTI TruPulse Laser, Vertex Laser Geo, DP GPS DME, Measuring tape, Walktax/topofil), slope corrector, scientific calculator, hammer, slasher, machetes, axes, saws (chainsaw, two-man saw, bow saw)
Facilitation techniques	Demonstration by viewing videos and films, simulation, Individual and group work, Practical exercise, Individualized, trainer guided and Group discussion, Oral presentation
Formative assessment methods	Written assessment, Oral assessment, Product assessment and Performance assessment

Learning outcome 3: Restore harvested areas

Learning hours: 25

Indicative content

- Description of forest restoration techniques
 - ✓ Reforestation
 - ✓ Invasive species management
 - ✓ Restore ground water levels
- Description of key components of forest landscape restoration
 - ✓ Landscape
 - ✓ Natural ecosystems
 - ✓ Stakeholders
- Identification of forest landscape restoration interventions
 - ✓ Forest lands
 - ✓ Agricultural lands
 - ✓ Protective or buffer lands

- Management of tree stumps
 - ✓ Tree stump removal
 - ✓ Tree stump treatment
- Establishment of antierosive ditches
 - ✓ Filtration ditches
 - ✓ Contour ditches or trench
 - ✓ Cut-off drains
- Tillage of forest harvested area
- Carrying out of forest reconversion/conversion activities

Resources required for the indicative content

Equipment	PPE, GPS, Laptop, Projector, screen projector, wheelbarrow, stump grinder, Dumpy level, theodolite, Total station
Materials	pegs, chemicals, ropes
Tools	Distance measuring tools (HAGLÖF Vertex, LTI TruPulse Laser, Vertex Laser Geo, DP GPS DME, Measuring tape, Walktax/topofil), slope corrector, scientific calculator, hammer, slasher, machetes, axes, saws (chainsaw, two-man saw, bow saw)
Facilitation techniques	Demonstration by viewing videos and films, simulation, Individual and group work, Practical exercise, Individualized, trainer guided and Group discussion, Oral presentation
Formative assessment methods	Written assessment, Oral assessment, Product assessment and Performance assessment.

Integrated/Summative assessment

WPA Ltd (Wood promoter's Association) is a company located in BURERA District, with sustainable mandate to manage existing forests in this district. There are 20 ha of mature forest from which 5ha are harvested in phase I. during harvesting activities, some malpractices have been observed and led to temporary suspension of harvesting activities. Those malpractices include but not limited to poor felling techniques, unsustainable extraction of timber, and degradation of forest land.

For the company to resume harvesting activities, it is looking for a skilled forest technician to elaborate forest harvesting plan, carry out forest harvesting and restore the harvested site.

As forest technician, you are recruited to conduct forest harvesting activities through demonstration as follows:

1. Elaborate a forest harvesting plan for 1ha in three (3) hours.
2. Fell four (4) trees selected in the forest in two (2) hours.
3. Restore harvested site of five (5) ares in three (3) hours.

Instructions:

1. Tools, materials and equipment are available in the store
2. Time allowed to accomplish these tasks is eight (8) hours

Resources

Equipment	PPE, Chainsaw, tackle, winch, logger, tractor, feller buncher, forwarder, skidders
Materials	Water, grinding stone, fuel, spare parts, paints, waring tape, notebook, pens, oil, water, lubricant.
Tools	Panga, axe, steel cable, Logtong, cant hook, map, sharpening file, wedge.

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
1. Prepare for forest harvesting activities. (20%)	1.1. Tree parameters are correctly measured in accordance with tree usage	Height is measured			2
		Diameter is measured			2
		Circumference is measured			2
		Tree volume is calculated			2
		Basal area is calculated			2
	1.1. Forest harvesting permit is carefully applied for in accordance with forest laws and regulations	Harvesting license is applied for			2
		Tax to be paid is calculated			2
	1.2. Forest harvesting plan is properly elaborated in accordance with forest harvesting operations	Tools and equipment are selected			2
		Harvesting method is selected			1

		Extraction methods are predetermined			1
2. Perform forest harvesting. (50%)	2.1. Forest harvesting techniques are properly selected in accordance with issued permit	Mature trees are marked			5
		Felling direction is determined			5
		Felling notch is executed			5
		Felling cut is made			5
		Size of hinge is respected.			5
	2.2. Timber products are properly sorted according to their end use	Structural timbers are sorted			5
		Decorative timbers are sorted			5
	2.3. Timber products are properly stacked in accordance with their grades	Timber products are graded			5
		Timber products are labelled			5
	2.4. Timber products are properly transported according to available transportation means	Way of transport is selected			5
3. Restore harvested areas. (30%)	3.1. Forest restoration techniques are properly identified with reference to forest status	Restoration techniques are identified			3
	3.2. Stumps are properly managed according to the forest age and species	Tree stumps are treated			3
		Uprooted stumps are disposed			3
	3.3. Anti-erosive ditches are properly established according to landscape	Ditches are established			3
		Ditches are maintained			3
	3.4. Forest harvested area is properly tilled according to soil structure	Site is cleared			3
		Harvested site is tilled			3
		Waste is disposed			3

	3.5. Reconversion/conversion is properly conducted according to landscape	Tree species are selected			2
		Replanting is done			2
		Planted trees are protected			2
		Environment is protected			2
Total marks		100			
Percentage Weightage		100%			
Minimum Passing line % (Aggregate): 70%					

Reference books:

1. Food and Agriculture Organization (FAO). 1996. FAO Model Code of Forest Harvesting Practice. Rome: FAO. Available at: <http://www.fao.org/documents/>
2. FAO. 1999. Asia – Pacific Forestry Commission, Code of Practice for Harvesting in Asia – Pacific. Rome: FAO. Available at: www.fao.org/docrep/004/ac142e/ac142e00.htm
3. Lamb, D., & Gilmour, D. (n.d.). *Rehabilitation and Restoration of Degraded Forests*.
4. ILO. 1998. Safety & Health in forestry work. An ILO code of practice. Geneva: ILO. Available at <http://www.ilo.org/public/english/protection/safework/cops/english/index.htm>
5. ILO SafeWork Bookshelf. Encyclopaedia of Occupational Health and Safety. Wood Harvesting. Available at <http://www.ilo.org/encyclopaedia/>
6. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5110681.pdf
7. <https://www.ifc.org/wps/wcm/connect/b34bd571-e6f8-4b64-abac-7c4bceb521bb/Final%2B-%2BForest%2BHarvesting%2BOperations.pdf?MOD=AJPERES&CVID=nPtgnPP>
8. <https://unece.org/fileadmin/DAM/timber/storm/manual/chap52.pdf>
9. <https://www.fao.org/3/ca6932en/CA6932EN.pdf>
10. <https://www.ifc.org/wps/wcm/connect/b34bd571-e6f8-4b64-abac-7c4bceb521bb/Final%2B-%2BForest%2BHarvesting%2BOperations.pdf?MOD=AJPERES&CVID=nPtgnPP>
11. <https://www.interfaithrainforest.org/wp-content/uploads/2021/06/IRI-forest-restoration-primer-Final.pdf>