



## THINK NAMIBIA Sustainable Forest Management

*Sitambo sosimbapira esi si gave nombudi nomafwatururo kuhamena evaruro yitji yowiza ntani nomulyo gegendesoyukiliro lyowiza ntani mulyo gegendeso wiza wekungo va tulisa po.*

### ETWAROMO

Simwe somulyo momarunone gowiza sesi asi kugaruganesa mowiza/ megunda olyo gana kara; yangesi kuyirugana mevaruro lyoyitji yowiza. Evaruro yitji yowiza kwa livarekere nosinka sowoma worunone rowiza oru rwa sesupire mekururongo lyaEuropa. Nye ngesi, evaruro yitji kuna kulirugana mwa za uzuni nauye konyima zonomumvho dononzi dina ka pita.

Nampili ngomu asi evaruro kwa liretesa po mokukonakona ekaro po lyoyitji yoyipirangi, sa kara simwe somulyo mekeverero ezokomeho lyegendeso runone rowiza. Evaruro yitji simwe soyina kugwanesa po poruveze rokutjangesa ekungowiza wonkarapamwe u kare paveta yipo u kwatese ko egendesoyukiliro lyowiza mosirongo. Evarurokonentu lyenene kulirugana mosirongo saNamibia, kuvarekera komakonakono gomowiza kuninkira kudimburura mavango gokuruganesa nomahina. Vanamukunda womakungowiza kuvakorangeda va rugane evaruro lyoyitji, eyi yina kutanta asi yipo va dive ekaro/ emoneko lyorumone mowiza, kumwe nokusikisa mo yina kugwanesa yekungowiza pokutjangesa ntani nombapirapulisiro kuzangura.

### YINKE EVARURO YITJI YOWIZA?

Evaruro yitji yowiza kwa fwaturuka ngesi asi nkedi zokutura kumwe nokusingona yigwana yomarunone gowiza mevango lyokulikarera. Evaruro momunene alyo kulirugana kusikura nontambo ne odo konhi.



Ruhafano 1: Nontambo ne ava kwama nsene to rugana evaruro

## SIMBAPIRA SOUSILI KUHAMENA KO:

# Evaruro Yitji yoWiza

Evaruro kugava mulyo nomauzera gonombudi kuhamena unene, sivaro, ukaro, nomparukiso, ntani ukaro worunone rowiza. Nayoyi mulyo hena mokugava mauzera kuhamena ekuro lyoyimenwa mowizansitwe.

*Kusikura mbunga zoNondya noUnandima (FAO), ekuro lyofuraha alyo kukwama "kutara unene womaruha gositji mounene wo X cm unene wosikwamusere". Kuvarekera pedi lyontjima-ntjima ndi pontontera yikandwise dogoro kegoro lyometera sosikwamusere gontjima-ntjima zo Y cm, kupakakana ko nomutayi dogoro ponometera yereko W cm. Nkenye sirongo kunongonona mulyo go X, Y, ntani W.*

## MORWASINKE YAKARERA ASI EVARURO YITJI YOWIZA MUYO MEGENDESoyUKILIRO LYOWIZA?

Evaruro yitji yoWiza kasinongonona asi simwe samanampata megenseso Wiza ntani kuvatera kutura efaneko kumwe nokunomena runone monaruwa, sinene po yipirangi.

- Evaruro mulyo morwa kugava/ kudimbwilisa mulyo gorunone rowiza oru runa kara po rwa wapere kuruganesa nokuzangura, sinene po montontera zefanekogendeso lyowiza kumwe nonombapirapulisiro kuzangura.
- Evaruro kugava mauzera/ yitundwamo yomakonakono gekuro lyoyitji, eyi ayi gava ndimbwiliso kositji sina kuru sa hepa kusizangura.
- Mulyo gevaruro kuvatera nokutara elivhukiso lyoyitji, kukura, ntani esesupo, tayi gava erondoro lyewa ndi ukaro womalisintompepo monsitwe.
- Mulyo gevaruro googu asi kugava mulyo goyitji yoyipirangi ntani kunongonona udigu wompire/mundiro. Mulyo mokutulisa po nonkedikandano nomapukururo/ehaneso mbudi.

## YIGWANOTUNDWAMO YEVARURO YITJI YOWIZA

Egwanotundwamo alyo kusikura yitumbukira nomayeroko gevaruro, ntani nemoneko lyovantu wokuyirugana.

- **Sitambo ndi situmbukira sevaruro:** Evaruro eli kuvhura kulirugana rumwe tupu ndi kulirugurura. Evaruro lyomarunone gosirongo alyo kuhoroka nkenye apa konyima zonomvhu (10) murongo. Sinzi somavaruro goyitji kugarugana notambo senongonono yitji yoyipirangi. Poyiruwo yimwe nositumbukira sokugwana mafatururonkareso zowiza.
- **Simetesomukumo gevaruro (sivhiha):** Aso kuvhura kukara seyi yoyinunu ndi yoyinene.
- **Udivi ndi vantu wokuyirugana:** Udivi ndi vantuke vana kara po nava vhura kurugana evaruro olyo?
- **Ekaropo lyonombudi dokukwatesa ko:** Sihonena, efaneko mafano nekwatero mpepo pasatelite po yi li po?

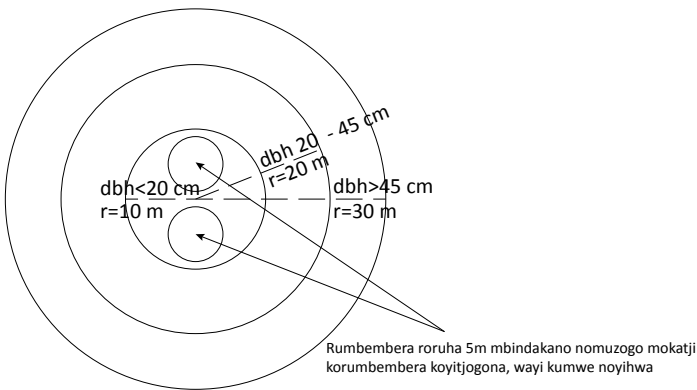
## Makonakono gomowiza/ evango

Ngendeseso zomakonakono gomowiza kukwafa nokupulisira wombunga zokuvarura yipo va gwane mauzera gomarunone gana kara mevango. Eyi kuvhura yirerupe kuyirugana kovanamukunda. Sihoneneso sevango lina kuvhura kusikonakona, ano sihetekomukumo sosinene kudigopa unene/ ndiro. Pegano, sihoneneso sokukarerera po mevango kusitota po; kuvhura kukonakona nkenye apa kusikura yigava vana pumbwa.



Efano 1: Kukonakona ekaro lyoyitji pevango (Kwatunda: N. Baptista)

Elikwamolya Namibia na Finland lyonsitwe kwalitulisire pomokurugana evaruro yitji yowiza momaruhayirongo kutunda momumvho 1990. Evaruro kwa liruganene koMuzogo nokoMuzogopumezuva gosirongo, mokuruganesa nkedi zekaro mevango tumbuliro yipo va guse yigava yokuyukilira. Eyi kuvatera yirugana yi rerupe nawa momawiza ga pira mpato norukukutu womalisintompepo.



Ruhafano 2: Edidiliko lyevango (Burke, Juola & Korhonen, 1996)

Sitafurafaneko 1: Mayereko patameko noyiruganeso

MAHETEKESO	YIRUGANESO YOMPUMBWE
Diameta	Livafanekeso, yipandekeso, ndi livameteseso
Musika moure	Simeteseso ndi ngundi zonde
Etatambero lyoyimeno	Livameteseso (musunda gometa)
Udivi woyimenwa	Mahina zomboragona
Evega	Efano lyokumetesesa evango (GPS)
Elivhukiso	Sitjimeteso
Etara-tara lyomundwire	Mpakero zokumetesesa

## Efano lyapampepo

Efano lyopampepo sirugana sosipe ava vhuru kuruganesa mokuvarura yimenwa. Eyi kukwafa mokugwana usimbu mauzera nomakonakono goyimenwagana noyitji ya kara nokuparuka mevango lina. Momavango gamwe gonometera kusika km<sup>2</sup>, ya ngesi ure ntani mbiliha sivhulise kuruganesa nomahina domafano gondira kumwe nosatelite mokugava matokoro gokulifana. Kuruganesa efano lyopampepo lyapumbwa ukonentu noudivi wokuliruganesa yipo yirugana yi sike mo, maudivi gangesi kugagwana melikwatakano nomavango gomalidewiro muna kwatere nonkurusure adi gava erongo kuhamena kuruganesa efano lyopampepo. Makonakono gamwe ga pumbwa kumeta pamundinda ngamoomu emeto lyounene wositji simwe somulyo nemevaruro lyoyitji yowiza.



Efano 2: Efano lyokuruganesa va faneke yimenwa mekonakono (Mufaneki: V. Amputu)

## Kantando komagazaro (GIS)

Kantando komagazaro kuhamesera mo egwano lyoyigava yokutunda konomahina ndi satellite. Mafano gopandira ndi gokosatelite kuvhura kugaruganesa mokugwana eyereko unene wetatambero lyowiza ntani kungungunikira unene woyitji, wiza wompato, ntani siviha sounene wevango. Erugano lyopepi kuvatera ekonakono ligwane ukanguki wosimenwa nomahako. Ekonakono lyokuruguruka kulirugana yipo asi va ngungunikire masinta-sinto moyigwana yoyimenwa mevango ntani nayimwe hena momumvho. Kantando komagano kuvhura kugaruganesa mokufaneka makonakono gomosirwa. Deura zokuyukilira kumwe nombapirapulisiro kuruganesa nomahina kudipumbwa yipo o rugane sirugana sokantandofaneko. Eruganeso lyokantando magano moNamibia kulizonagwisa po morwa ruhayera romavango mowiza, eyi kuresesa po mafano ga kare gana livhonga-vhonga noyininke peke: kupakera mokumonekesa yitji, yitjigona/yihwa, evhu, ntani pomaruveze gamwe kulikida ruha romundiro, kuninkisa yidigope mokuhangura wiza woyitji nomusitu goyitjigona.

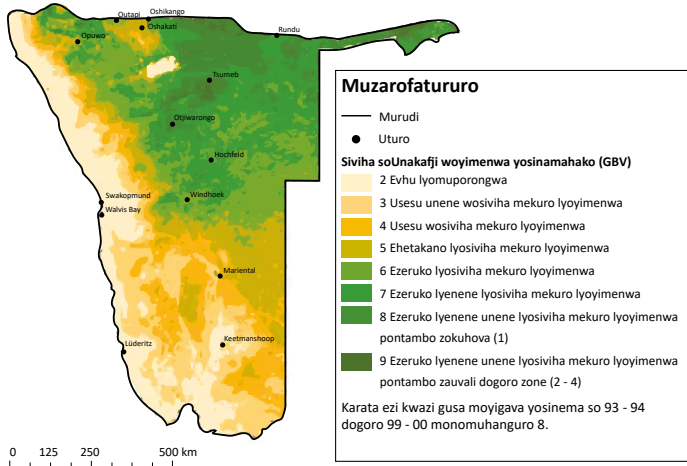


Ruhafano 3: QGIS simwe soumanguruki meruganeso GIS asi vhuru kukwafa erongo lyokantando konakono (<https://qgis.org>)

## Engungunikiro lyekuro lyoyiweka nosiviha

Ndambo zomuhowo engungunikiro lyoyiweka kuyereka evango/ ruha rowiza.

### Siviha yitundwamo soUnakafji woyimenwa yosinamahako moNamibia



Ruhafano 4: Siviha soyimenwa kuvhura naso kungungunikiro pokuruganesa kantando kegano aka ka kara hepero zegawo eyereko lyompepo zoyitji (Kwa si pulisira: University of Cologne)

Ekuro lyoyiweka kuyivarura kukwama nkevarwiso zoyitji nayinye yonometera 5 cm mo DBH kumwe tupu nonomutayi. Nkevarwiso ezi kwazi tota po asi zimwe zemelikwamo lyaNamibia – Finland lyekungonsitwe ntani kwa lihamesera koyitji ya kara momaruhasirongo gane (4), Kugatumbura: Zambezi, Otjozondjupa, Oshikoto naOmusati.

## Engungunikiro lyekuro yitji kuruganesa udivinkedi woyimenwa

Udivinkedi woyimenwa kutanta asi elirongo kuhamena ekuro lyonontjima-ntjima doiyitji momumvho ndi mosinema mokuruganesa nkediongononi. Kuyirugana mokuyereka nomvhura doiyitji ntani kukwafa eparuko lyoyimenwagana moukarompepo mevango lina. Udivinkedi woyimenwa yangesi, kapi ava u ruganesa unene moNamibia, morwa magunda ga yunda kapi mwa kara yitji ayi kuru momumvho, mokudidilika yitji yokukura nayinye va hepa kuyikonakona marudi gayo. Kukwama udigu womalisintompepo mosirongo, kuruganesa nkedi peke zengungunikiro nomvhura dositji yina yorudi yoyipirangi kukwama ntjima-ntjima saso.



Efano 3: Kuruganesa mahina gomboragona yipo va gwane yikaramo mositji yipo va ruganene udivinkedi zoyimenwa

Sitafurafaneko 2: Ekamo lyoyimenwa mokuyihetakanesa mononkedi domalisigo gayo

	Ekonakono lyowiza	Efano	Ure womagazaro
Utamuniki weruganeno/ kudumika	Hawe	Yimo	Yimo
Diameta	Yimo	Yimo, kukwama tupu malikwatakano gonomotayi ntani diameta zoyihatji	Yimo, kukwama tupu malikwatakano gonomotayi ntani diameta zoyihatji
Musika	Yimo	Yimo	Yimo
Engungunikiro lyompatu wiza	Yimo	Yimo	Yimo
Ukanguki noukalinawa wostji	Yimo	Yimo	Yimo
Engungunikiro Siviha noUnzi	Yimo	Yimo	Yimo
Ekuro lyositji	Yimo	Yimo	Yimo

Nonkediruganeso dokulisiga-siga noyitambo peke kukwama keturo mosirugana ntani ya hepa udivi. Nonkediruganeso kuvhura kudiruganesa mokukondopeka ukaro wouwa, eyi nayi tompoka melikwatakano lyouhameni ntani noukonentu wokukarerera mekuliko.

## ELIHAMESERO LYOVANAMVHARERWA NOVANAMUKUNDA MEVARURO YITJI YOWIZA

Mulyo unene vanamukunda va lihamesere mevaruro yitji, morwa simwe somulyo moyinakugwanesa po momafanayiko negendeso yiyiyauka yekungo wiza. Kuvatera mokugwana nompito donongwa, kuwapeka nokuwapukurura nkareso, ntani kutunga magano gougwenya.

- Yimwe yontanteko zemeto ekonakono mowiza kuyirugana mokutumba vanamukunda va kare vagendesiv/vanomeni vegunda, nomavangokungiro gamwe ngwendi wiza wompongasano waLikwaterera (Likwaterera Community Forest), va kambadara mokuyirugana yiyo ya va tompoka.
- Varongwa wokononkurusure ava va tunga monomukunda odo, kuvakuta/ kuvapa yirugana yipo va rugane sirugana sevaruro mokukwama koudivi womalirongo gawo momalizuvho kumwe novanamukunda.
- Nosure da kara momudingonoko ndi pepi nevango lyekungowiza va hepa kuvapura ko ndi kuvakorangeda yipo va vhure kugava ko magano gawo melikwamo lyevaruro eli, morwa yiyo yimwe ya kara moyirongwa yawo.
- Eruganeno kumwe nelikwatakano kwayi korangeda, sinene po nonkurusure domonomukunda nedi domakonakono, morwa da kara nonzira domaliyongo gomawa moudivi wonodeura kuhamena egendeso lyevaruro yitji yowiza, nokukamununa ntani kufwaturura.

Evaruro runone rowiza simwe sa mana mpata megendeso wiza ntani mulyo mokugava mauzera mokurugana matokoro. Ngendeseso zavaruro ozo vana horowora vanamukunda za hepa kuliza kumwe nounene wevango, yipo asi va vhure kugusa/ kugwana yigava nkenye siruwo. Simpe kudigopa mokudimburura asi mauwa musinke ava gwanene mo vakwate si ko, wononkurusure mokurugana evaruro lyokuyuka.

## MAFWATURURONKANGO

### Evango lyadumikwayitji [Canopy cover]:

Kwa divikwa asi, evangodumiko eli lya dumikwa koyitji yegunda yina.

### Ukonentu woyimenwa [Dendrochronology]:

Ngendeseo zovakonakoni eyereko nomvhura doytji (yimenwa) mokuruganesa yitareso.

### Diameta zoUnene noUre [DBH]:

Sihetekeso soyitji monometa 1.3 kutunda pevhu kukanduka.

### Siviha sEgunda [Forest biomass]:

Kukwatakana maruha nagenye gositji, omu yina kara rutu rositji, nomutayi ntani yihako rambangako nonondandani.

### Mahinameteseso evango [GIS]:

Mahina ava ruganesa mokumeteseso evango mokugava nombudi nomauzera, gomafano nsene mahina zina meta ndi zina faneke, hena kutarurura eyukiso kumwe nokugava karata zokuyuka.

### Kantando komagano [Remote sensing]:

Ngendeseso zokugwana mauzera goproyeka kevango lyoure kuruganesa satellite ndi kandiragona kefano.

### Etatambero lyoyimenwa [Vegetation cover]:

Kukwama noperesenta devango oloyo lya kara noyimenwa. Omu muna kara yimenwa yokulisiga-siga ngwendi: Wayi, yitji youhaku, ntani yitji.

### Muzangu [Yield]:

Unzi worunone runa kara po mokuzangura ndi kuyiruganesa.

## MAUMBANGI

Burke, A., V. Juola, & K. Korhonen, 1996. *Field instructions for the NFI* (Namibia Finland Forestry Programme, National Forestry Inventory Sub-component). Ministry of Environment and Tourism, Windhoek.

De Cauwer, V., 2016. *Towards estimation of growing stock for the timber tree Pterocarpus angolensis in Namibia*. Namibia University of Science and Technology.

De Cauwer, V., 2020. The timber harvest peak of 2018 in Namibia. *Roan News*, Namibia Environment & Wildlife Society, Windhoek.

De Cauwer, V., N. Knox, R. Kobue-Lekalake, J. Lepetu, M. Ompelege, S. Naidoo, ... & R. Revermann, 2018. Woodland resources and management in Southern Africa. In R. Revermann, K. Krewenka, U. Schmiedel, J. Olwoch, J. Helmschrot, & N. Jurgens (ed). *Climate change and adaptive land management in Southern Africa-assessments, changes, challenges and solutions*. Klaus Hess Publishers, Goettingen and Windhoek, pp. 296-308.

Kanime, N., 2005. *Global forest resources assessment: Country report-Namibia*. FAO, Rome.

Mati, J. & S. Dawaki, 2015. Role of inventory in sustainable forest management: A review. *International Journal of Forestry and Horticulture*, pp. 33-40.

Morales, D. & M. Piazza, n.d. *Forest inventory: Basic knowledge*. FAO, Rome.

Seppanen, H., 2001. *The Namibia Finland Forestry Programme*. IFFN, Windhoek.

Shikanghala, S., 2020. Dendrochronology in Namibia: A review. *International Journal of Environmental Sciences and Natural Resources*, pp. 192-200.

'Promoting Sustainable Forest Management in the Kavango-Zambezi-Region in Namibia'



This project is funded by the European Union

Mutjangi: Miya Kabajani

Pembankuru 2021

Mupiruli: Stefanus M Kudumo (Rukwangali)



### MOKUZUVHA KO YOYINZI GWANEKERA NOPROYEKA ZA-NSFM:

Hanns Seidel Foundation (HSF) Namibia, House of Democracy  
70-72 Dr Frans Indongo Street, Windhoek West; P.O. Box 90912, Klein Windhoek, Windhoek, Namibia

Tel: +264 (0) 61 237 373 Email: [sustainability@hsf.org.na](mailto:sustainability@hsf.org.na) [www.thinknamibia.org.na](http://www.thinknamibia.org.na)

[facebook.com/thinknam](https://facebook.com/thinknam) [twitter.com/thinknamibia](https://twitter.com/thinknamibia) [instagram.com/thinknamibia/](https://instagram.com/thinknamibia/)