ICARDA

Science for resilient livelihoods in dry areas

VegMeasure

VOLUME 1: FIELD MANUAL

CGIAR RESEARCH PROGRAM ON Livestock

TOOLS & GUIDELINES

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Tools & Guidelines
ICARDA's Tools & Guidelines series taps the Center's expertise to provide comprehensive advice and strategies that researchers can adopt to enhance agricultural productivity and overcome critical challenges affecting rural communities in the non-tropical dry areas.

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About ICARDA
Established in 1977, the International Center for Agricultural Research in the Dry Areas (ICARDA) is a non-profit, CGIAR Research Center that focusses on delivering innovative solutions for sustainable agricultural development in the non-tropical dry areas of the developing world.

We provide innovative, science-based solutions to improve the livelihoods and resilience of resource-poor smallholder farmers. We do this through strategic partnerships, linking research to development, and capacity development, and by taking into account gender equality and the role of youth in transforming the non-tropical dry areas.

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Introduction

VegMeasure is a Digital Vegetation Charting Technique (DVCT) that measures vegetation on the ground in a non-destructive manner. Just like quadrat sampling, it assesses vegetation cover to determine the ecological status of the study area. In particular, it allows rangeland ecologists to make meaningful classes to measure the percentage cover of foliage, litter and bare ground, as well as other categories of interest. However, DVCT is much quicker, more objective, and allows the derivation of additional metrics than traditional quadrat sampling. The colors recorded by digital cameras used in DVCT may be interpreted using VegMeasure computer software to create meaningful classes, such as dark brown soil, white litter, and green leaves, and the software allows the extraction of hue, calibration of thresholds, classification of K-means, and setting of brightness and green leaf algorithms. Large scale maps may be created with greater ease using this digital method and repeat monitoring tracks temporal changes in vegetation. DVCT is more accurate than subjective data collected by numerous field surveyors and a permanent digital record is generated that may be revisited.

It is important that certain field data collection procedures are followed when using this method, including an understanding of the required software. This manual series has been created to facilitate the use of DCVT: Volume 1 describes field data collection and Volume 2 teaches how to process images using VegMeasure computer software. Volume 1 is intended to be used in the field to aid camera setup and field data collection, while Volume 2 is designed as an office-based manual, for image processing. This volume describes how to setup and use the camera in the field.

1. Camera setup

Having a standard camera setup that accurately tracks the date, time, and the location in the same image resolution is essential for data comparison. This can also save on data corrections later on.

To save time in the field and to ensure accurate comparison of images, check that the time, date, time zone, image resolution, and GPS data recording settings are correct. Frequent checking of the settings is important, because they may be inadvertently changed by multiple users or when the battery is removed.

Step 1: Time and date setup

As well as setting the time, setting the **Time Zone** is important, so that changes in time are properly reflected.

Turn the camera on.
Press **Menu**,
then select **Setup**.

Select **Time zone and date**, then press ▶ ( )

Use ◀ or ▶ to select your **Home time zone**,
then select **OK**.

Date format: Press ▲ or ▼ to choose the date format.

Set the **Date and time**.

Press ▶ To move from one item to another.
D: day;→M: month;→Y: year→hour→minute.
Use ▲ or ▼ to set values.

Then press **OK**.

Step 2: Image resolution

High Resolution is important to capture the greatest amount of detail required for detection of changes in vegetation. Make sure you set your camera to the highest resolution possible.

Go to Menu → Setup → Image mode

Choose the highest resolution (here it is 16 Mb, **4608 x 3456**). This will enhance the quality of the image output (processed image) and produce more accurate results.

Press **OK**.

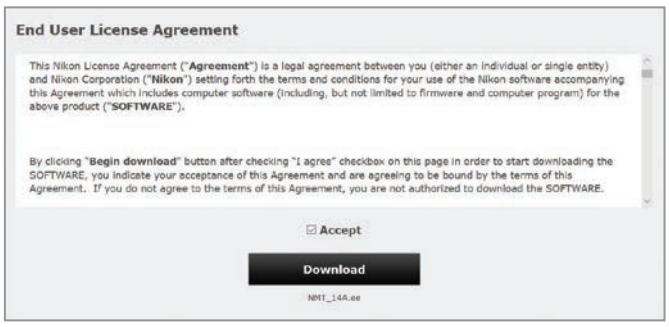
Step 3: Nikon camera GPS file download

Rapid determination of GPS positions in the field is important to ensure quicker data collection and reduce duplication of images, because images taken in close proximity may result in overlap due to poor accuracy of point acquisition. This file should be downloaded to your camera SD card to improve the speed and accuracy by which points are acquired.

Visit the website http://nikonimglib.com/agps3/index.html.en

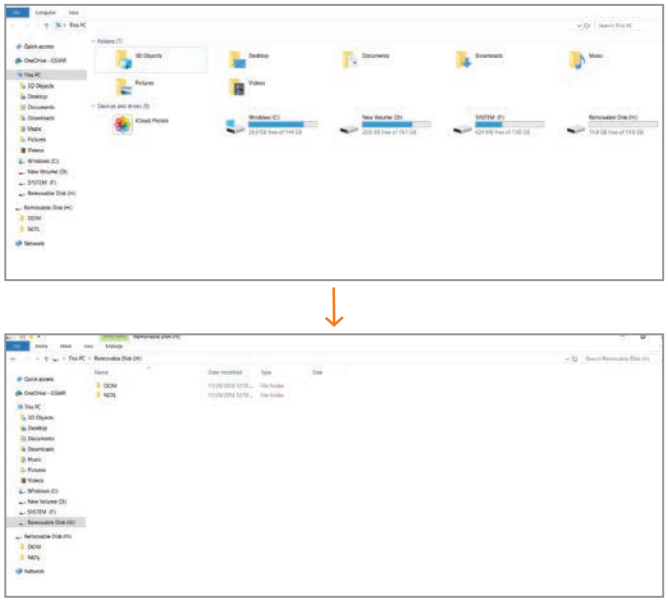
Download the file “NMT_14A.ee”

Remove the SD memory card from the camera and insert it in the computer. Then open the SD memory card folder.



Copy the file that was downloaded to the “NCFL” folder in the camera SD memory card.

See the next steps below.



When complete, remove the SD memory card from the computer and insert it in the camera.

Press the **Menu** button and then select **GPS options**.

Select **Update A-GPS file** to update the file.

Press **OK**.

Step 4: GPS data recording

Enabling GPS recording on the Nikon allows the camera to receive signals from GPS satellites; without this, the camera is unable to receive data and synchronize signals from the GPS satellites with collected image data and associated camera time settings.

Press the **MENU** button and select **GPS** options.

Press ▶

The default setting for **Record GPS data** is **Off**; to change it press ▶

Select **On**, press **OK**, and then press the **Menu** button.

Note: To allow the camera to get a GPS Fix, turn the camera on and **Record GPS data** for at least **15 minutes** before taking any photos.

2. Data collection

Standardized field collection that accurately measures plant cover and type is essential for the minimization of data collection errors and comparison of data.

Follow these documentation procedures to ensure standardization of data collection and reduction of data collection errors.

Step 1: Print the area of interest

Print a satellite image that contains an overlaid boundary of the area of interest to help orient the data collectors to the study site and plan the sample locations.

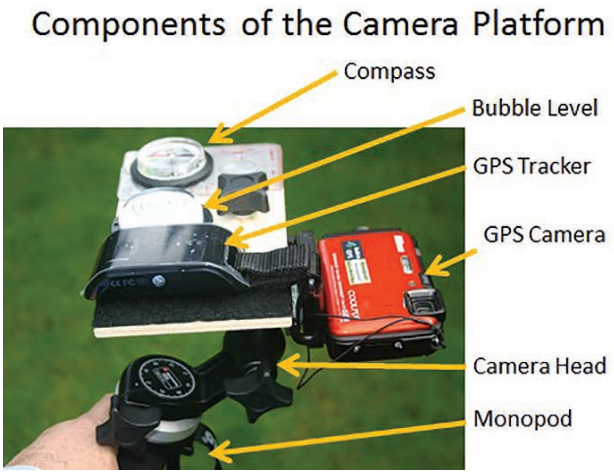
Step 2: Take reference photos of the dominant species

Close-up reference photos of plants in the field allow operators to detect and document dominant species and may be used for subsequent species identification as well as to observe the prevalence of different species.

Step 3: Assemble the camera platform

A compass, bubble level, camera, wooden platform, and monopod are essential components for the camera platform.

In case the digital camera does not have a built in GPS, a GPS tracker may be included on the platform to locate field data collection positions.



Attach the Bogen-Manfrotto 3025 3D Junior Tripod Head to the monopod.

Attach the digital camera to the Bogen-Manfrotto 3025 3D Junior Tripod Head.

Using the bubble level, ensure the camera is vertical and directed towards the ground.

Step 4: Adjust camera height

Find a comfortable position to hold the monopod, making sure your feet are behind the camera and not in the field of view, and adjust its height. If there are multiple data collectors, make sure the monopod is comfortable for all users, as the height should not be changed during sampling. To keep the camera coverage area constant across the whole site, keep the height of the camera constant throughout the sampling period.

Error Check
Keep the height constant throughout the sampling period.

Step 5: Measure height

Take note of the height from which pictures are taken. Any changes in height during the sampling period will introduce errors.

Measure and record camera height in field data collection forms/notes.

Step 6: Check the level again . . .

The correct angle of the camera is important. After adjusting the camera height, it is important to re-check the level and adjust, using the bubble, accordingly.

Step 7: Choose an orientation (N or S)

Eliminating shadows is important to reduce the introduction of errors through correct image identification and processing. The camera must be oriented in a direction that eliminates shadow effects.

Read the directional orientation on the compass and record it in your field data collection forms/notes.

Error Check
Keep the orientation constant throughout.

Step 8: Take landscape photos

Site overviews are helpful when you are back in the office to provide overall orientation and understanding of the study site and its condition.

Reposition the monopod to take landscape pictures.

Step 9: Start taking images

Stand in a comfortable position and take pictures of the ground, following the standardized spacing and collection methods. Ensure the camera remains upright between pictures to maintain the satellite fix and use the default setup of the optical zoom (do not zoom in or out).

Error Reduction Recap:

- Do not change the height once it is set
- Do not change the orientation once it is set
- Do not zoom in or out
- Keep the camera upright to maintain the satellite fix
- Keep the same camera and picture settings.

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