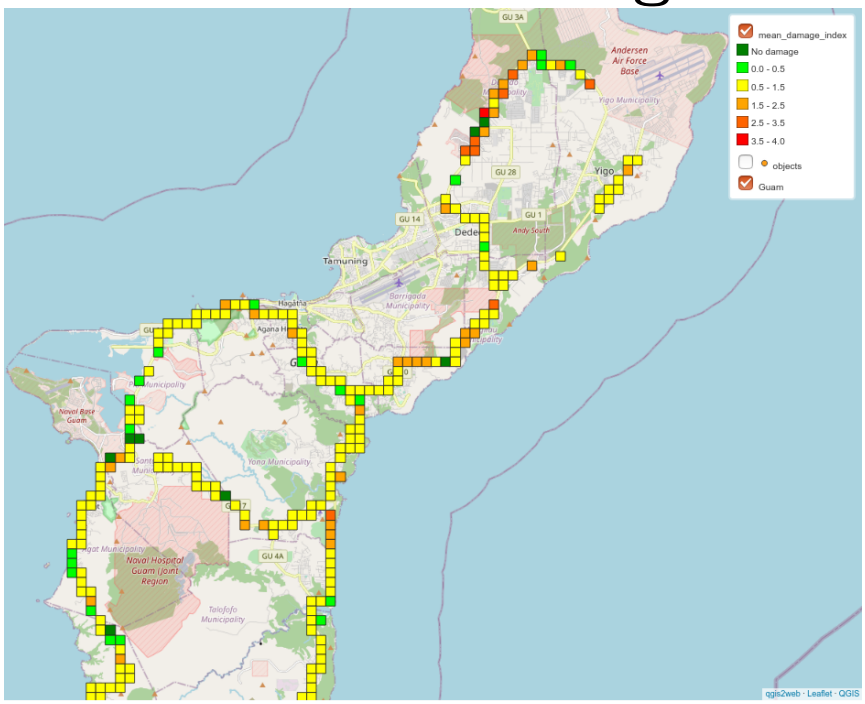
PRELIMINARY RESULTS

Roadside Video Surveys of Coconut Rhinoceros Beetle Damage



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2020-08-19 13:57:57+10:00

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[1]The most recent version of this document can be downloaded from https://github.com/aubreymoore/roadside/blob/master/docs/roadside/roadside.pdf.

1 Background

To see how coconut rhinoceros beetle damage surveys are currently done, please read Jackson 2019 and Vaqalo et al. 2017.

2 Data Acquisition

2.1 Mounting a Smart Phone on a Vehicle

Preliminary work show that mounting the smart phone externally produces much better results than mounting the phone internally as a dash cam. This eliminates problems cause by dirty windshields and internal reflections.

A smart phone can be mounted externally using a ball and socket anchored using a strong magnet (1).

Optimal placement of the smart phone camera appears to be above the right-hand corner of the windshield (passenger side in the US).

2.1.1 Setting the Direction of View Angle

The direction of view angle has two components, a horizontal angle with respect to direction of travel and a vertical angle. The horizontal angle is set using the scale at the base of the ball joint. The vertical angle is set using a free Android app called Clinometer (`https://play.google.com/store/apps/details?id=net.androgames.clinometer`) (Fig. 2).

Optimal angles for direction of view appear to be 45 degrees to the right of direction off travel and 15 degrees above horizontal.

2.2 Parameter Choices

2.2.1 Camera and Lens

We are currently using a Samsung Galaxy S10 smart phone. This phone is equipped with four cameras including a 16MP ultra-wide-angle camera (123° field of view) which seems to be a good choice for this application.

2.2.2 Resolution

Maximum resolution for videos recorded with the ultrawide angle camera is 4K 3840x2160 (16:9, 8.29MP). Initial recordings were made using this resolution, but this can probably be reduced without significant loss of precision.

2.2.3 Frames per Second

Standard frame rate is 30 fps. Initial recordings were made using this rate, but this can probably be reduced without significant loss of precision.

2.3 Using the Open Camera App

Open Camera (https://opencamera.org.uk/) is a FOSS app for Android smart phones which enables much better control of hardware features than the default Camera app provided with Samsung phones.

Open Camera offers a plethora of settings which can be saved in a configuration file for later use. For screenshots of *Video settings* see figures 3, 4, and 5.

2.4 Using the GPSLogger App

Although **Open Camera** has an option to georeference video frames, this feature proved unreliable in preliminary tests. As an alternative, it was decided to use a free called **GPSLogger** which logs timestamped GPS coordinates to a file at a frequency of once per second. **GPSLogger** runs continually in background on the phone during a series of video recordings.

2.5 Georeferencing Video Frames

The author has cobbled together a **jupyter notebook** called **georef** which uses the **GPSLogger** log to calculate the GPS coordinates for frames video recordings based on timestamps (seeinteractive map for displaying coconut rhinoceros beetle roadside video survey routes with popup thumbnail images at points of interest. The prototype map is at https://aubreymoore.github.io/qgiswebmap/webmap/webmap.)https://github.com/aubreymoore/roadside/blob/master/jupyter%20notebooks/georef.ipynb).

2.6 Mapping

Interactive web maps for displaying coconut rhinoceros beetle roadside video survey routes with popup thumbnail images at points of interest can be put together using QGIS with the QGIS2WEB plugin. A prototype QGIS project is available in a GitHub repo at https://github.com/aubreymoore/qgiswebmap and a prototype map is available at http://github.io/aubreymoore/qgiswebmap/webmap/webmap.

3 References

Jackson, Trevor A. (2019). "Rhinoceros Beetle Damage. Workshop with Kokonas Indastri Koporesen (KIK). Madang, PNG". In: URL: https://api.zotero.org/groups/511387/items/QMD5TZQU/file/view.

Vaqalo, Maclean, Visoni Timote, Senimili Baiculacula, Gideon Suda, and Frank Kwainarara (2017). *The Coconut Rhinoceros Beetle in the Solomon Islands: A Rapid Damage Assessment of Coconut Palms on Guadalcanal*. URL: https://api.zotero.org/groups/511387/items/LJDIQZYA/file/view.

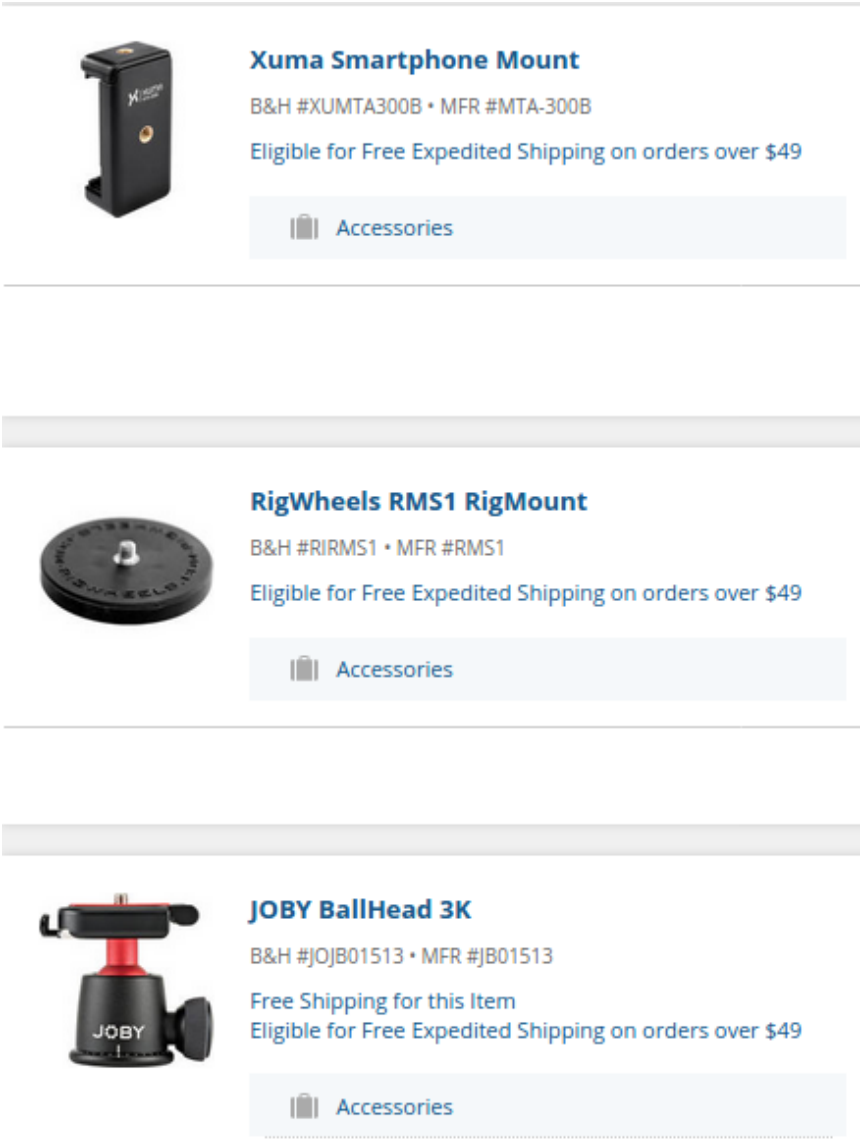

Figure 1: Smart phone mount.

Figure 2: Setting camera angles using Clinometer app.

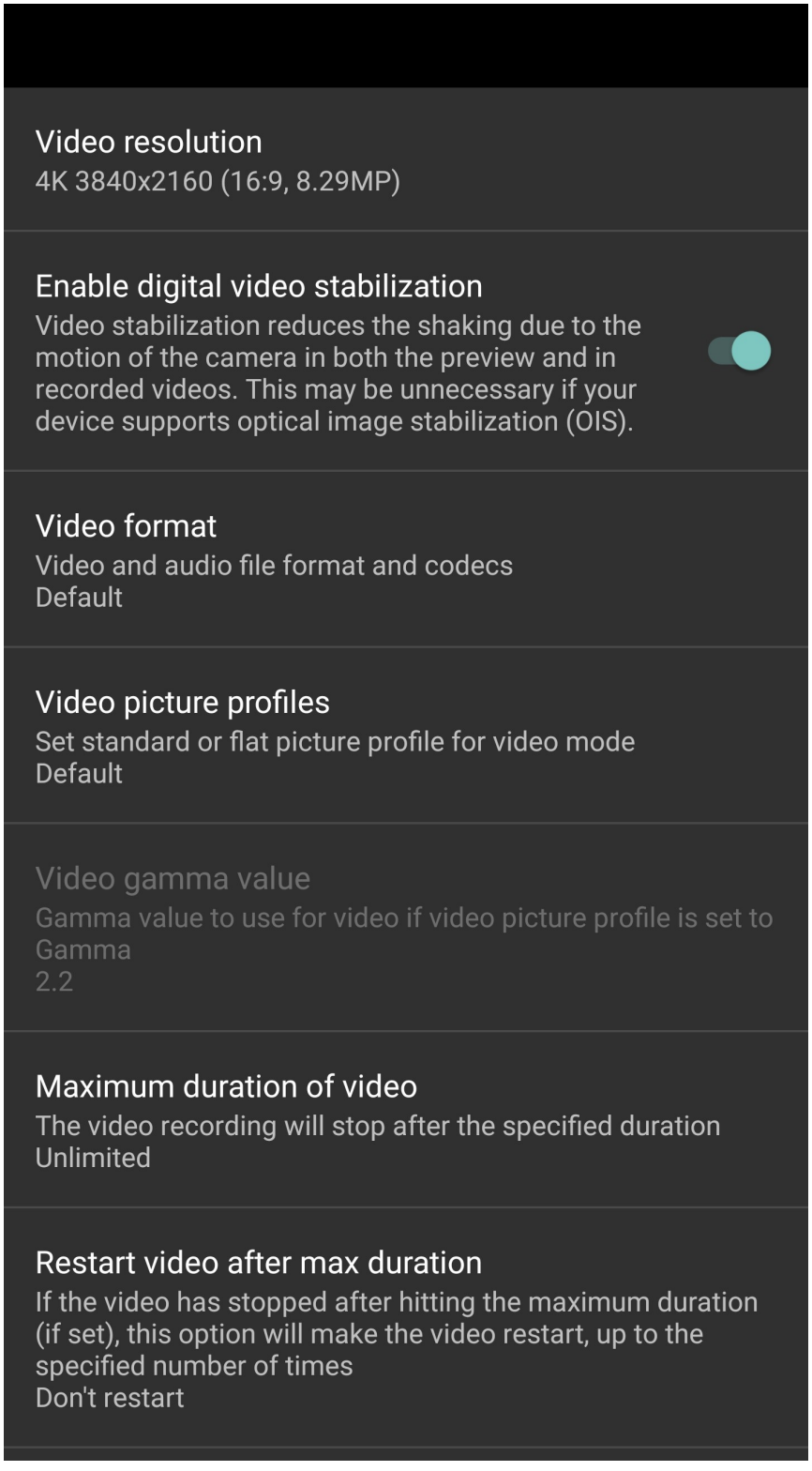

Figure 3: Video settings (1/3).

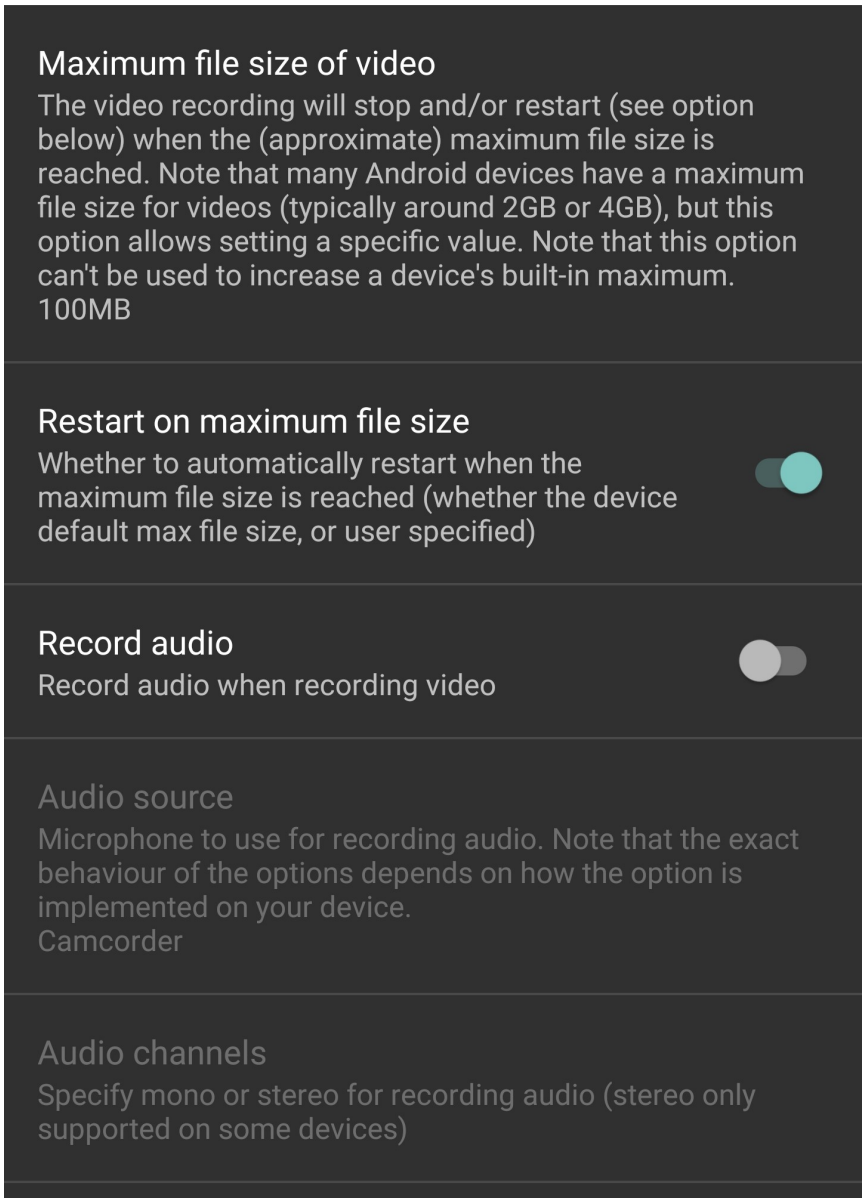

Figure 4: Video settings (2/3).

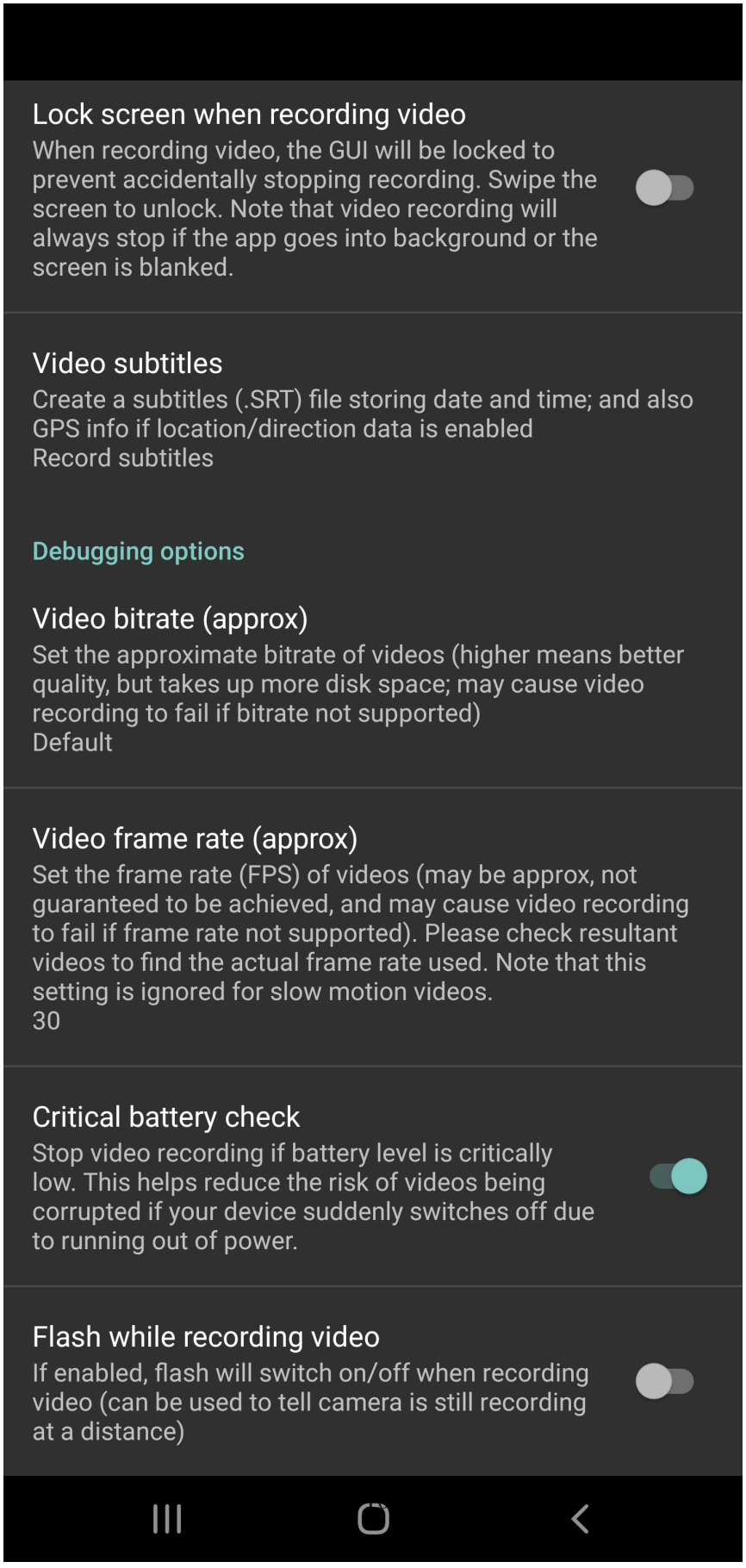

Figure 5: Video settings (3/3).