

**Project Update: February 2022**

**1. Field collection data**

The data collection was done covering the western side of the country except a location where forest fire had not occurred before. During the field visit, the GPS coordinates of every sighting were recorded. More than 100 occurrence points were recorded for forest fire with most from Thimphu. Further occurrence records will be added through secondary sources for the construction of the model. Forest fire occurrence points were mostly seen at Thimphu followed by Wangdue Prodrang, Punakha, Paro, Trongsa and least was found at Bumthang.

On other hand, mostly forest fire incidences occurred in an area covered by blue pine and Chir pine forest. Evidence from incidences shows that there are various forest fire causes, mainly due to anthropogenic activities - burning agricultural debris, children playing with match sticks, cow herders, lemon grass harvesters, development activities such as road workers and electricity transmission line short circuits.

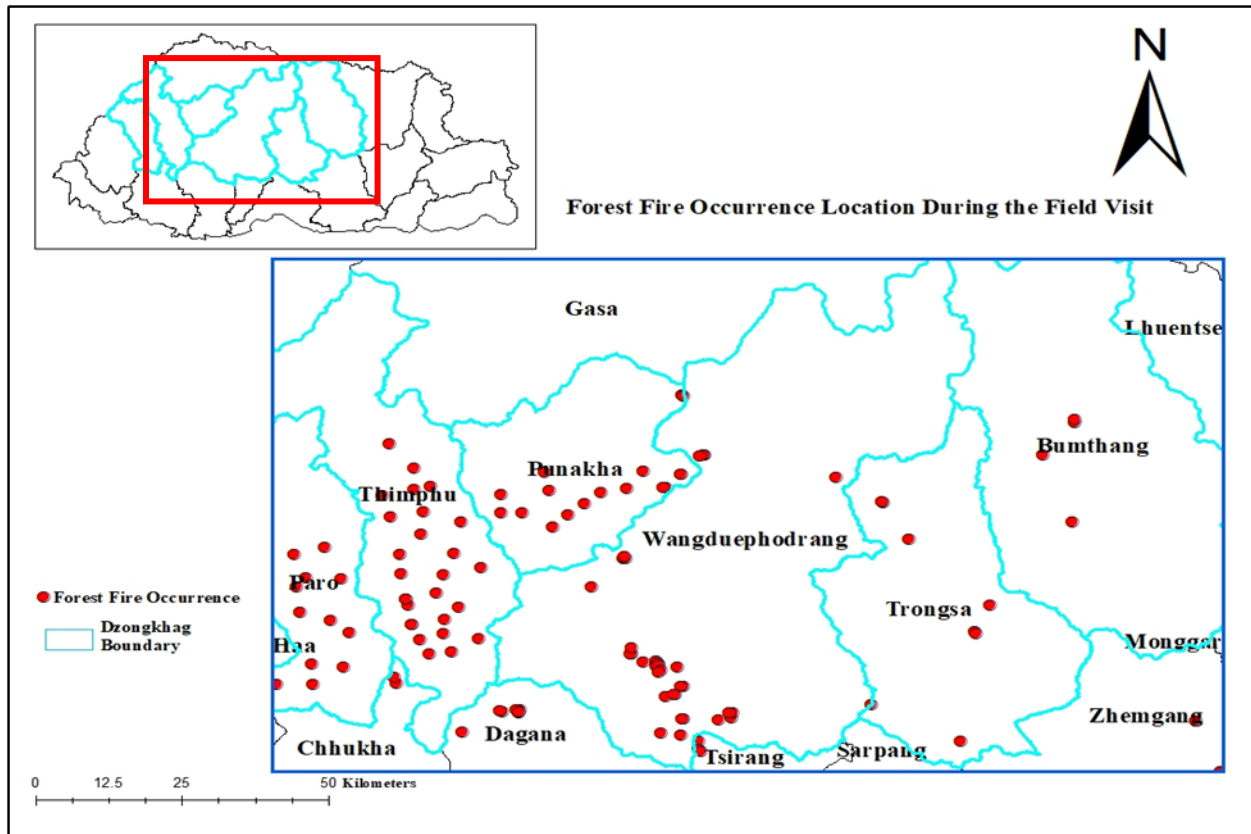


Figure 1: Forest Fire Occurrence Location During the Field Visit.



Figure 2: Forest Fire Incidences at Wangdi Tshe, Thimphu Bhutan (2021).





Figure 3: Forest Fire Incidences at Sanga chokhorling, Paro, Bhutan (2018).



Figure 4: Forest Fire Incidences at Punakha, Bhutan (2021).



Figure 5: Forest Fire Incidences at Tamachu School, Lhuentse, Bhutan (2021).



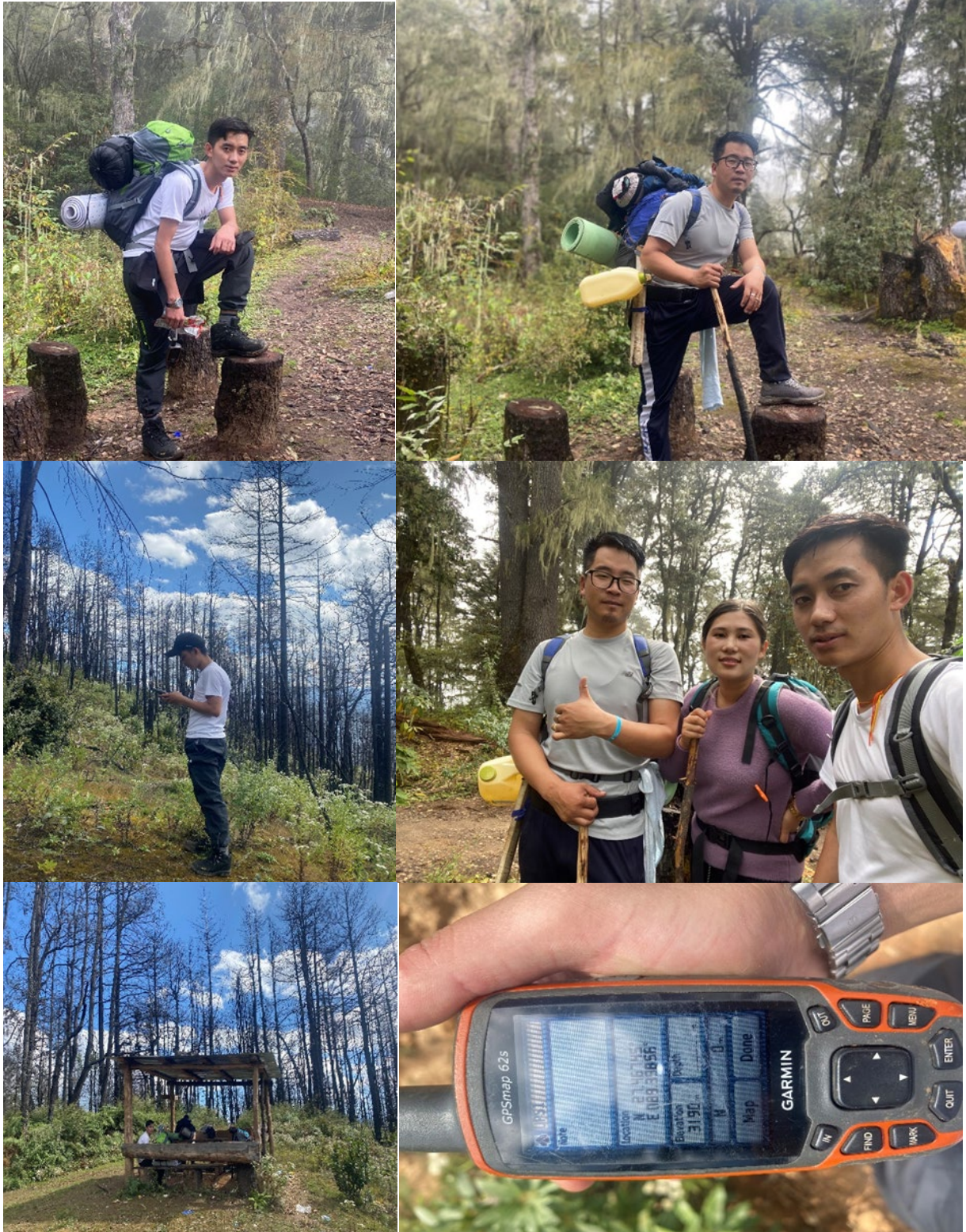







Figure 6: During the data collection of Forest fire coordinate with my two co-workers.



## 2. Equipment purchased

Sl. No	Name	Picture
1.	<b>Laptop (Mac Book Pro M1)</b> – The Laptop is purchased software dependent with high computing capacity that will fulfill the Model Development.	
2.	<b>4G Pocket Wifi</b> – This Instrument is purchased for Internet connection during my study.	
3.	<b>Hard Disk (TOSHIBA)</b> – The shapefiles and raster data of study area are stored in the Hard Disk and data Preparation Files.	
4.	<b>Trekking Bag</b> – The Bag carries things that required during the data collection in the field.	
5.	<b>Trekking Boots</b> – This Boots is put up during the collection of data in the field.	

## 3. Data preparation to Developed Model

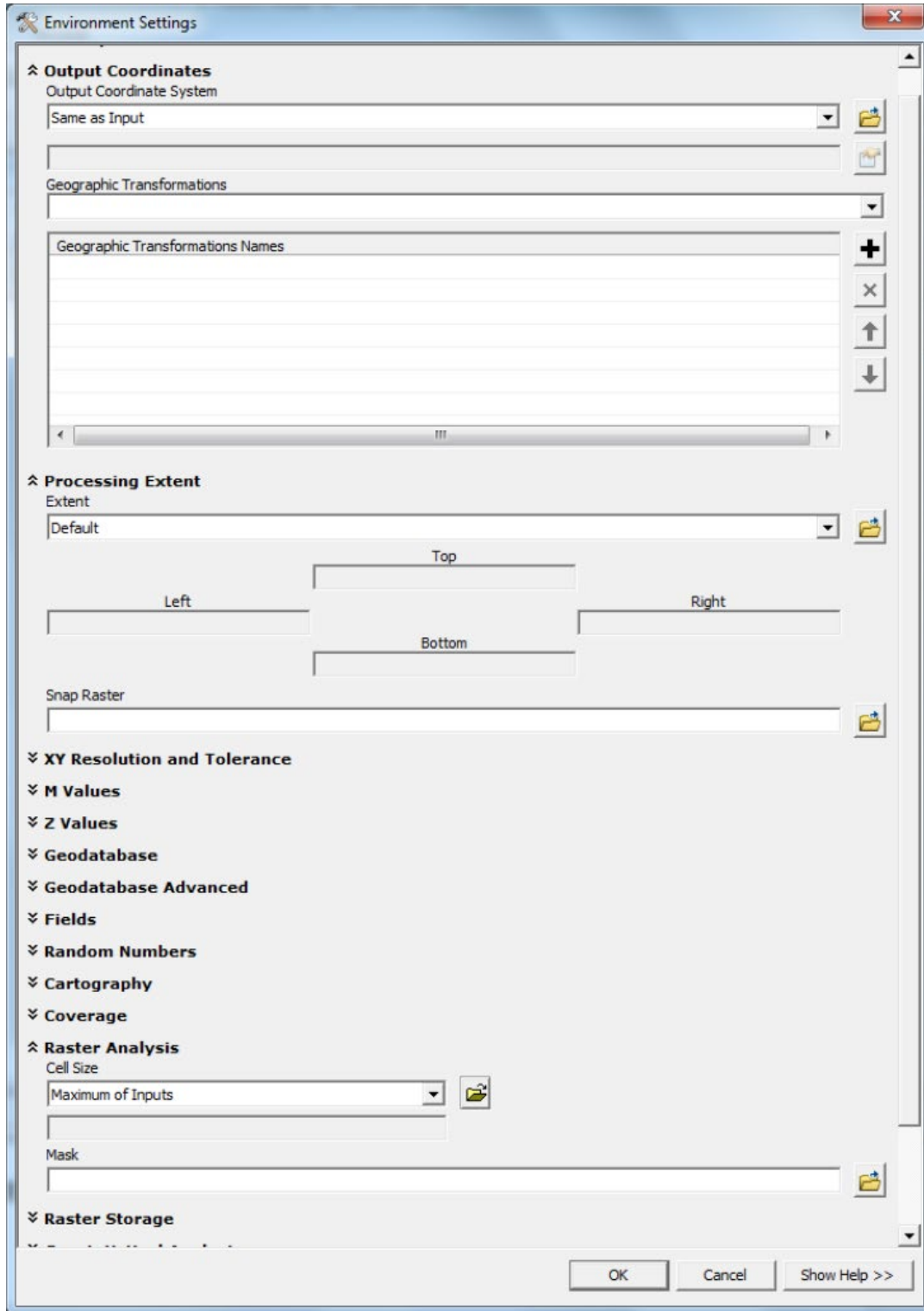
### I. Downloading Environmental Variables –

- **Bioclimatic Variables** - Bioclimatic variables were downloaded from <http://www.worldclim.org> database (Version 2.1) or from the web link <http://www.worldclim.org/bioclim.htm>; (Hijmans et al., 2017).
- **Topographic Predictors** - The elevation data was obtained from SRTM DEM downloaded from USGS Earth Explorer (<https://earthexplorer.usgs.gov/>). This was used to derive topographical layers (slope, aspect, elevation, TWI, HLI).
- **Land cover Predictors** - LULC, country boundary, settlement, road, drainage and river shape file of Bhutan was obtained from head office of Department of Forest and Park Service under Ministry of Agriculture and Forest, Government of Bhutan.

In order to predict how the forest fire hotspots will change under future climate change scenarios, future projections were made using Model for Interdisciplinary Research on Climate Change (MIROC5) 2050 and 2070 data under the Representative Concentration Pathways (RCP) RCP 2.6, RCP 4.5, RCP 6.0 and RCP 8.5 were downloaded and extracted with Bhutan Map Boundary.

## II. Modifying Environmental Layers

All the environmental layers should be in raster format and have the exact cell size and projection system (e.g., geographic or UTM) in order to execute a model.



### III. Converting Environmental Raster to ASCII Format

All the environmental layers were converted into ASCII format with an extension '.asc' to make them ENM and MaxEnt software program compatible. This was done using conversion tool>Raster to ASCII>File save as. asc.

