TREPA
Transforming Eastern Province through Adaptation

RFA
Rwanda Forestry Authority

GREEN CLIMATE FUND

CIFOR
World Agroforestry

Output 3.3: Enhancing tree seed and seedling supply to provide diverse and climate adapted species and varieties within the framework of TREPA 2022-2027

CLIMATE CHANGE ANALYSIS WITH WORLDCLIM 2.1: VOLUME 2.

Standardized Precipitation Evapotranspiration analysis (SPEI)

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This report provides figures that show Standardized Precipitation Evapotranspiration Indices focused on the Eastern Province of Rwanda. The report was prepared with latest available data from WorldClim 2.1, corresponding to global circulation models and scenarios (Shared Socioeconomic Pathways) prepared for the IPCC AR6. All data and software used are open access.

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1. Project area

The project area consists of seven districts in the eastern province of Rwanda (figures 1.1 - 1.3).

Figure 1.1. Focal districts for the project have been labelled in this map. Administrative boundaries from the GADM database (www.gadm.org; version 3.6; downloaded 2-DEC-18). Boundary of Akagera National Park (green) obtained from World Database on Protected Areas (https://www.protectedplanet.net/862; version 1.4; downloaded 2-DEC-18) Map prepared in QGIS with OpenLayers plugin.
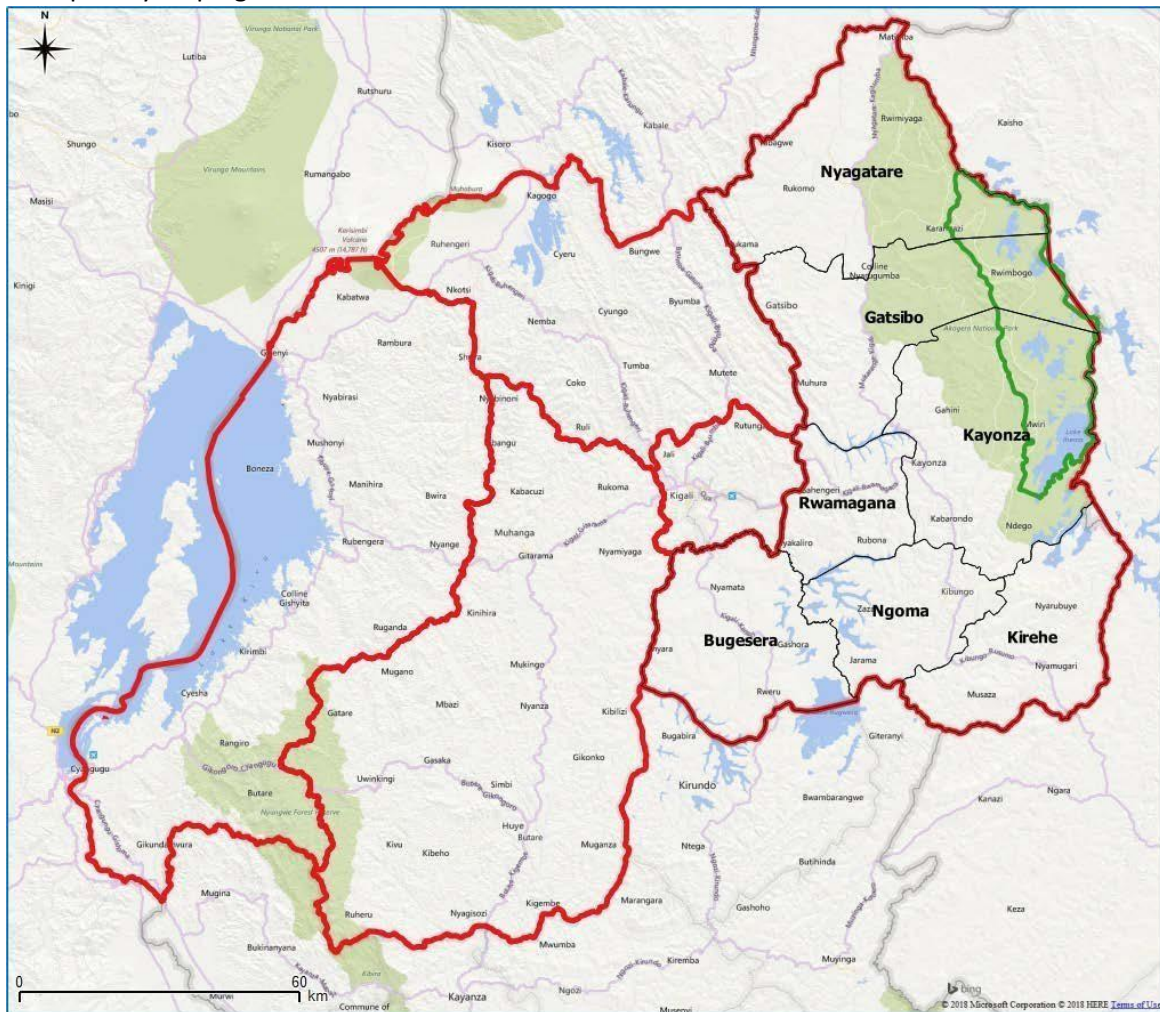
Figure 1.2. Focal districts for the project have been labelled in this map. Administrative boundaries from the GADM database (www.gadm.org; version 3.6; downloaded 2-DEC-18). Map prepared in QGIS with OpenLayers plugin, using the OSM map background instead of Bing as in Figure 1.1.
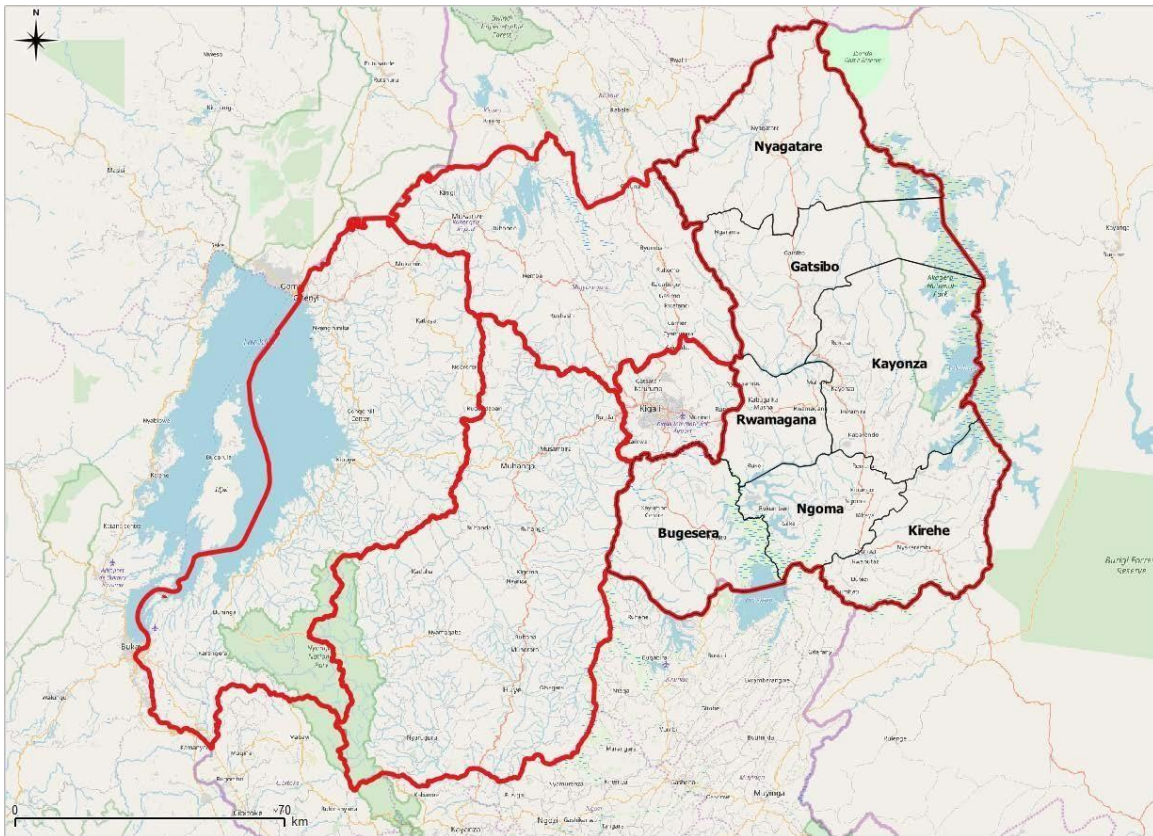

Figure 1.3. Focal districts for the project have been labelled in this map. Administrative boundaries from the GADM database (www.gadm.org; version 3.6; downloaded 2-DEC-18). Map prepared in QGIS with OpenLayers plugin, using the ESRI National Geographic map background instead of Bing as in Figure 1.1. Point locations are centroids used for subsequent analyses.

2. Standardized Precipitation Evapotranspiration Index

Figures in this section show the SPEI for 3-, 6- and 12-month periods. Districts are arranged from north to south, sorting them by the latitude of their centroids.

For the most recent decennium, the number of short-term drought periods is less than the number of short-term wet periods, except for Kirehe district (Table 2.1). However, for all districts when counting the number of short-term droughts and short-term severe wet periods since 2000, there were a higher number of short-term droughts.

For medium-term droughts, the same pattern prevailed of a higher number of severe wet periods in the most recent decennium and a higher number of severe drought periods since 2000.

Persistent droughts were observed in the most recent decennium for Kayonza and Kirehe, and persistent severe wet periods were observed in Gatsibo, Kayonza, Rwamagana, Ngoma, Kirehe and Bugesera. In none of the districts were persistent droughts observed before 1990 (figures 2.1 – 2.7).

Taken together, these results suggest that it is expected that the study area will continue to experience both periods of severe droughts and periods of severe wetness (increasing flooding and erosion hazards), especially for short-term (3-month) and medium-term (6-month) periods.

Table 2.1. Number of severe drought (SPEI -G1.5) and severe wet periods (SPEI H) in theí moXst ñ

recent decade starting 2010 (between brackets, numbers since 2000)

District	SPEI-3		SPEI-6	
	Droughts	**Very wet periods**	**Droughts**	**Very wet periods**
Nyagatare	2 (8)	3 (5)	2 (8)	2 (5)
Gatsibo	2 (8)	3 (5)	2 (9)	3 (5)
Kayonza	4 (10)	4 (6)	2 (9)	4 (6)
Rwanagana	3 (9)	4 (6)	2 (8)	3 (5)
Ngoma	3 (9)	4 (6)	2 (8)	3 (4)
Kirehe	5 (11)	4 (6)	2 (9)	4 (5)
Bugesera	2 (8)	4 (6)	2 (8)	3 (4)

Figure 2.1. Standardized Precipitation Evapotranspiration Index (SPEI) for Nyagatare. Years that are labelled in the graphs have months with indices below -1.5 (severe and extreme droughts) or above 1.5.
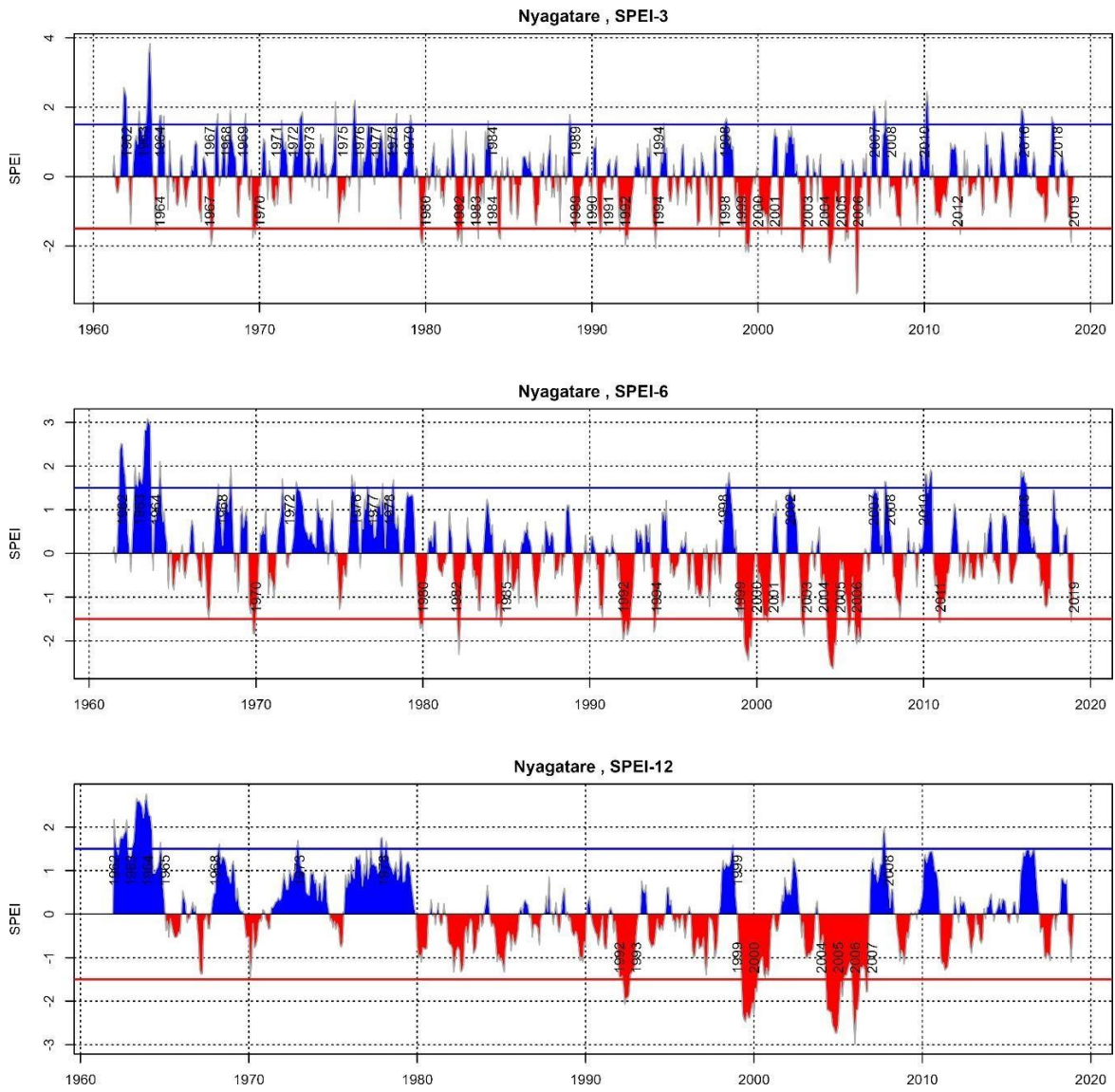
Figure 2.2. Standardized Precipitation Evapotranspiration Index (SPEI) for Gatsibo. Years that are labelled in the graphs have months with indices below -1.5 (severe and extreme droughts) or above 1.5.

Gatsibo , SPEI-3