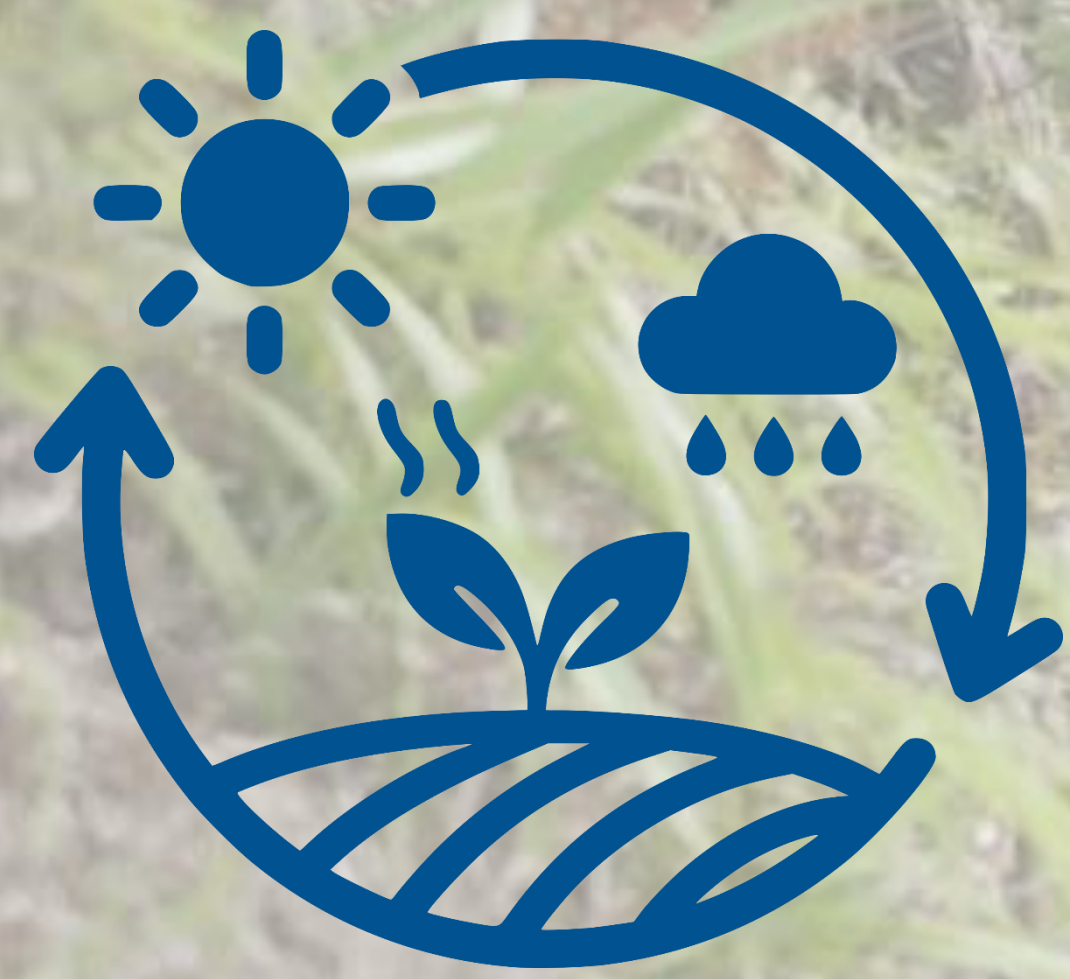




RAIN2ROOT: Probabilistic forecast of season irrigation water demand

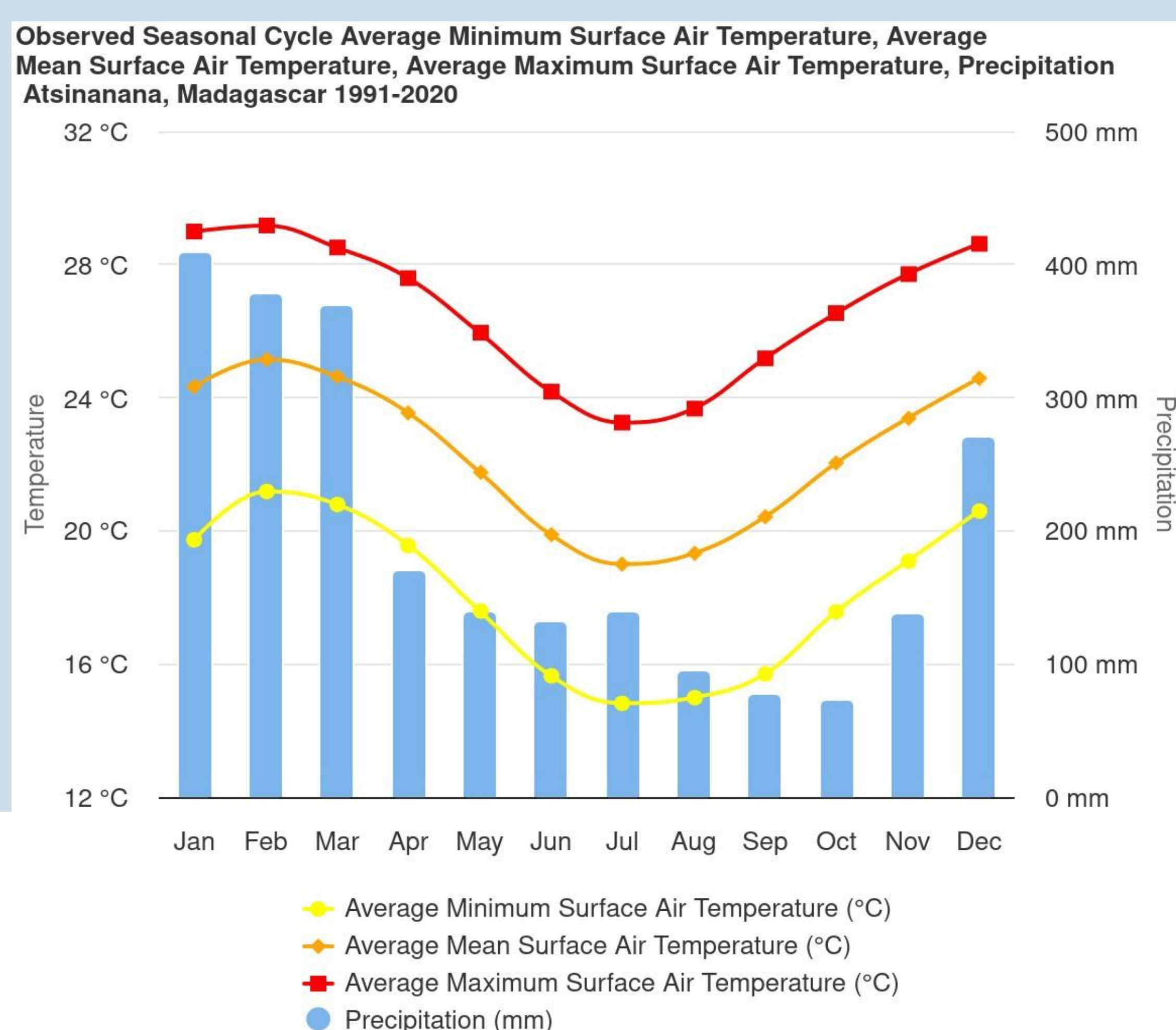
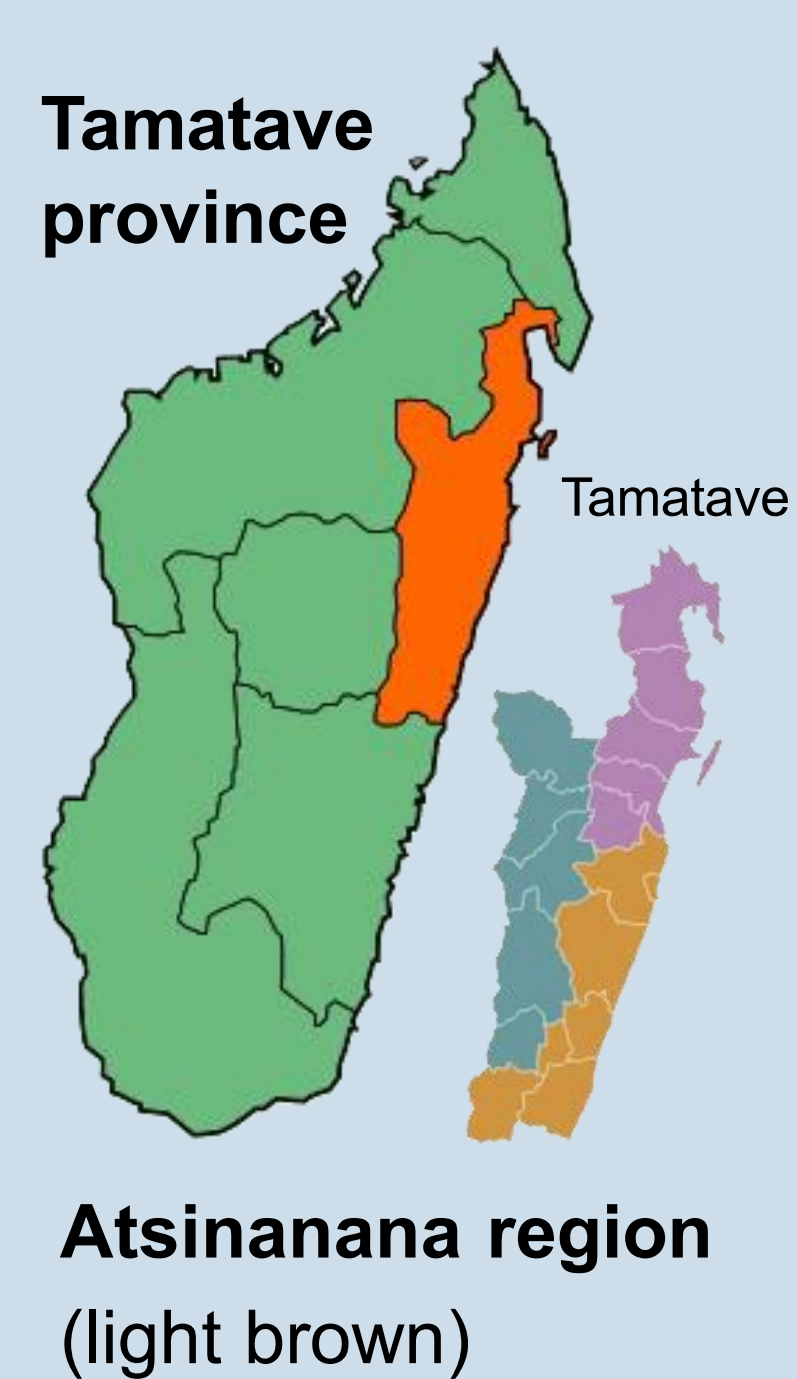
Tamatave



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Tamatave: region and climate

The Tamatave province (bright orange) is characterised by a narrow coastal plain bordered inland by reliefs. It has a humid tropical climate, with rainfall throughout the year and a marked peak in austral summer, which strongly shapes agricultural calendars. The plot below shows the monthly cycle of precipitation and temperatures in the Atsinanana region (CRU data, from climateknowledgeportal.worldbank.org).



References

- [1] McKee, T. B., Doesken, N. J., & Kleist, J. (1993, January). The relationship of drought frequency and duration to time scales. In Proceedings of the 8th Conference on Applied Climatology (Vol. 17, No. 22, pp. 179-183).
- [2] Dunning, C. M., E. C. L. Black, and R. P. Allan (2016), The onset and cessation of seasonal rainfall over Africa, J. Geophys. Res. Atmos., 121, 11,405–11,424, doi:10.1002/2016JD025428.

Hub users and expected user products

Tamatave is one of Madagascar's main coastal cities and economic hubs. In 2018 its urban district counted around 326,000 inhabitants, the wider Atsinanana region nearly 1.5 million. Its economy is connected to the port and to agricultural value chains from the eastern hinterland. Surrounding rural areas are dominated by diversified **smallholder farming systems**, often organised around agroforestry plots combining perennial cash crops (fruit trees, spices, clove, coffee, cacao and essential oils) with food crops such as rice and cassava. **Farmers are interested in seasonal predictions of rainfall** for planning planting periods, crop associations, drainage or water needs, and for managing risks linked to delayed rains, excess rainfall or erosion. To address farmers' needs, climate information should be simple, localised and communicated through trusted channels such as farmer groups, local workshops and demonstration plots. The tentative **crop calendar** shown below provides guidance on potential shifts in farming activities (blue arrows). This advice is based on seasonal forecasts of the SPI and rain-season duration (bottom panel), and is intended to be integrated into AgriSupport, the ALBATROSS Needs-based Adaptation Toolkit (NBAT).

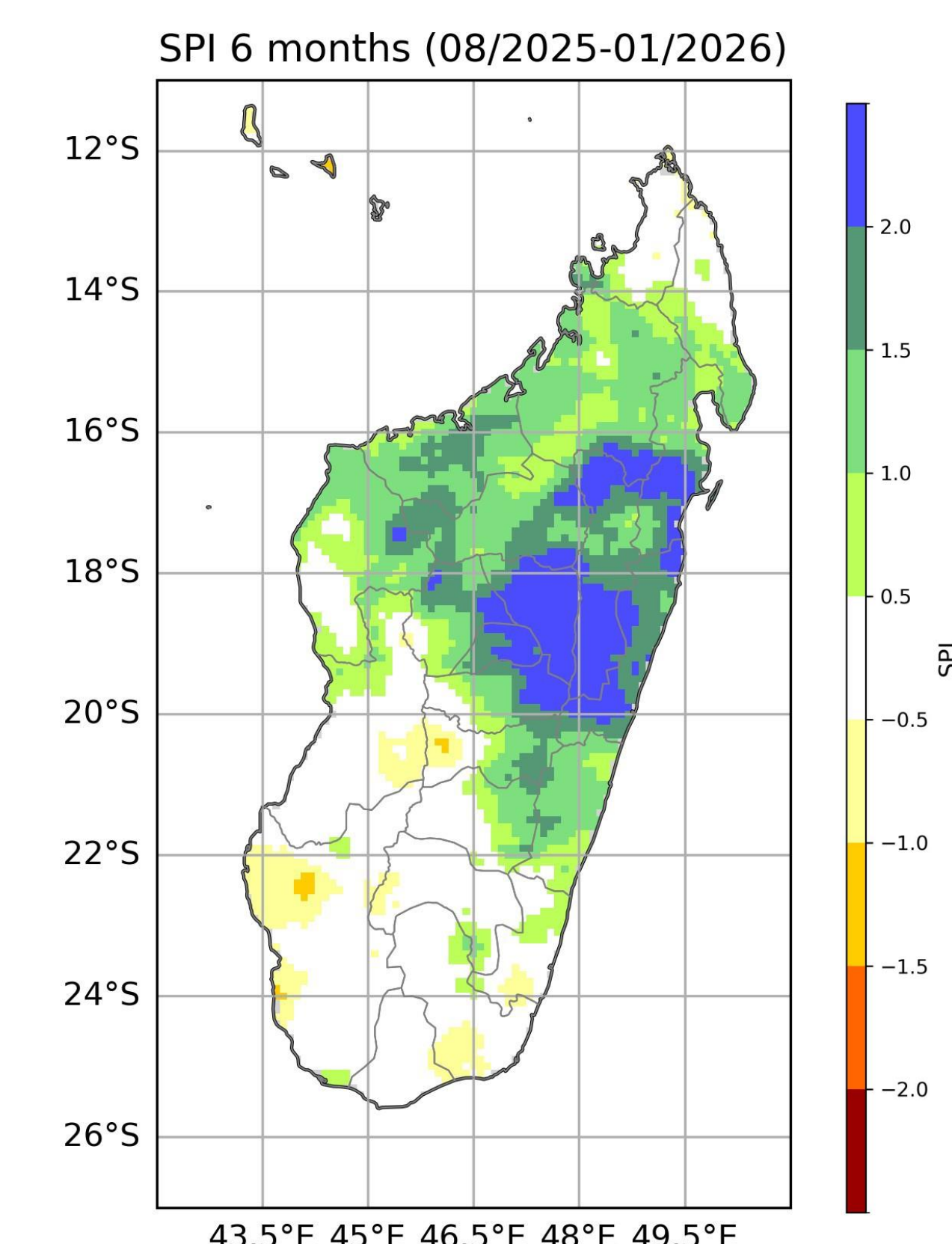


SPI6M Obs							
SPI6M For							
	Oct	Nov	Dec	Jan	Feb	Mar	Apr

Seasonal forecast of wet/dry conditions

The Standardized Precipitation Index (SPI, [1]) quantifies anomalies of cumulative precipitation at a given timescale, to indicate drier- or wetter-than-normal conditions. The plot on the right shows the observed SPI for Madagascar in the 6-month period ending in January 2026. The conditions are wet in the Tamatave province.

SPI (Standardized Precipitation Index)
ERA5-Land (1993-2022) - Madagascar - January 2026



Expected Climate Service

Forecast Product: hybrid observed-forecast SPI for Madagascar at the beginning of each month, computed over the 6-month period centered on that date.

Data: average SPI over 3 months of observations and 3 months of seasonal forecasts (C3S).

Pre-processing: downscaling of seasonal forecast to match resolution of observations.

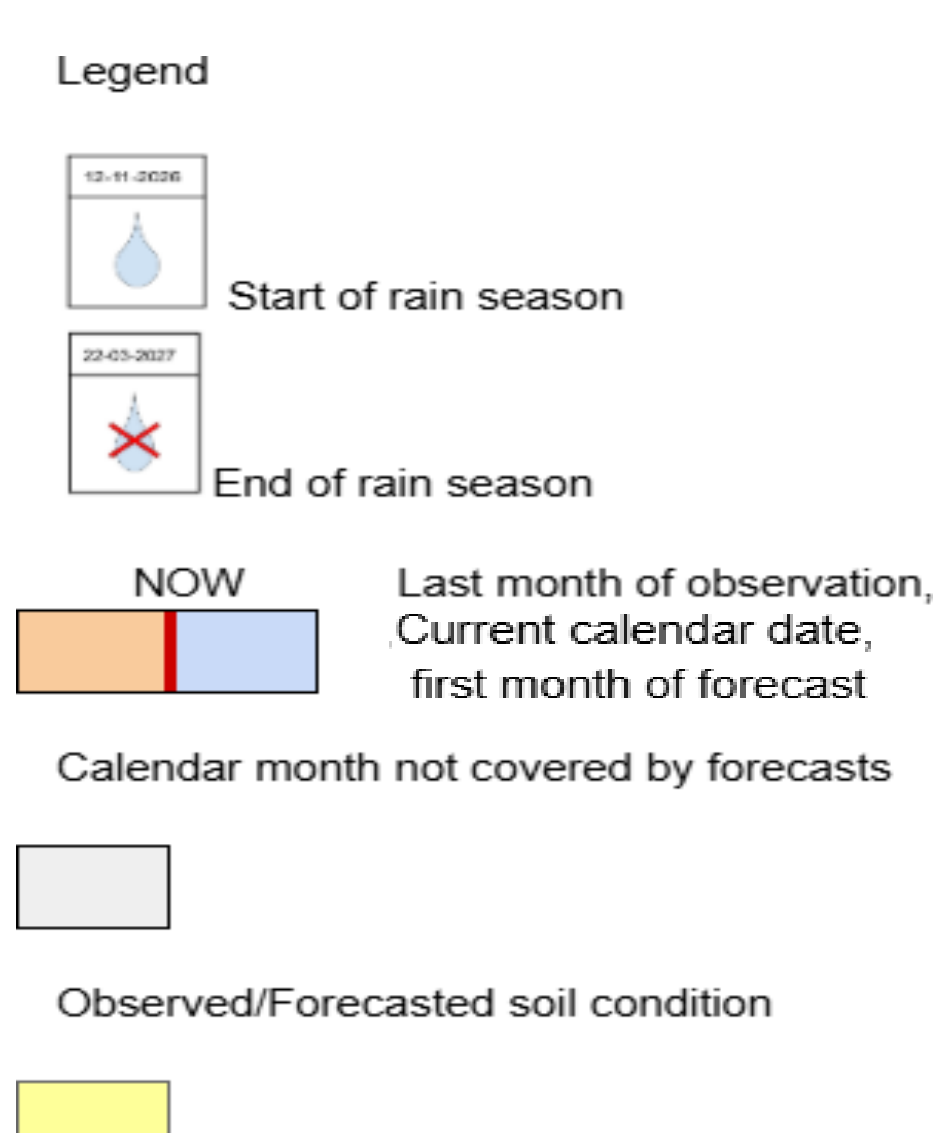
Seasonal forecast of rain season

Onset and duration of the main rain season are computed following the method in [2].

Expected Climate Service

Forecast Product: probabilistic predictions of the onset date of the rain season and/or of its duration, provided at the beginning of each month in the months preceding/following the start of the rain season.

Data: daily precipitation from C3S seasonal forecasts.



SPI Values	Class	Palette
$SPI \geq 2.0$	Extremely wet	
$1.5 \leq SPI < 2.0$	Very wet	
$1.0 \leq SPI < 1.5$	Moderately wet	
$0.5 \leq SPI < 1.0$	Near normal	
$0.0 \leq SPI < 0.5$	Normal	
$-0.5 \leq SPI < 0.0$	Near normal	
$-1.0 \leq SPI < -0.5$	Moderately dry	
$-1.5 \leq SPI < -1.0$	Severely dry	
$-2.0 \leq SPI < -1.5$	Extremely dry	
$SPI \leq -2.0$		

Hub coordinator and main implementer of interventions:

Bôndy International



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