Climate Information for Resilient Tea Production – CI4Tea – Briefing note – Malawi

Introduction

Climate change is a global phenomenon with potential effects at the local level. Our analysis of climate model projections indicates that mean annual temperature for Malawi may increase by 2.3 – 6.3°C by the 2090s (Figure 1), while rainfall projections are more uncertain (Figure 2). We observe that temperature and rainfall extremes are expected to increase. For example, the number of days with temperature more than 30°C is expected to increase, and the number of rainy days are expected to decrease. Tea, an important export of Malawi, is highly climate-sensitive, and climate change could affect future tea production and quality. Since tea stakeholders have long planning horizons, it is important to analyse climate change impacts and potential adaptation options at a scale of existing tea plantations and with respect to the aspects of the climate to which tea production and quality is most sensitive.
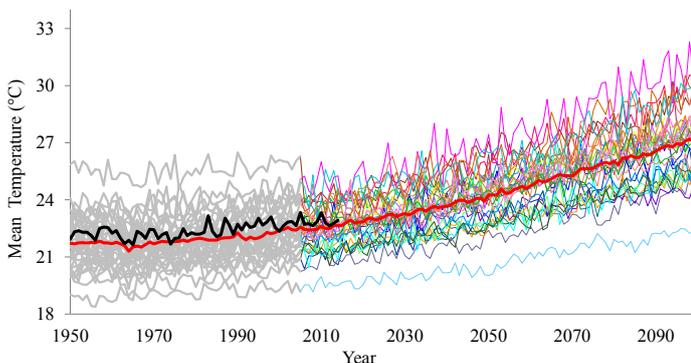

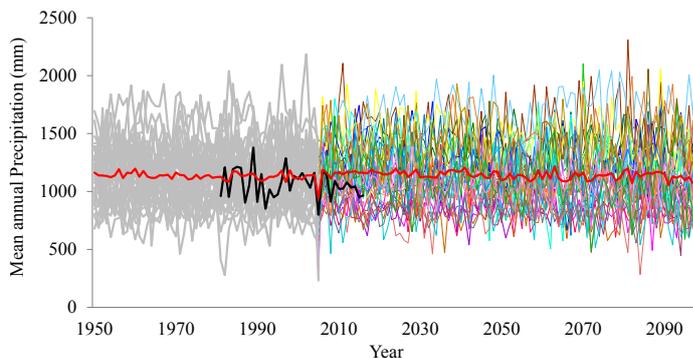Figure 1: Mean annual temperature time series for 1950-2099

Figure 2: Mean annual rainfall time series for 1950-2099

CI4Tea is a research project funded by the UK Natural Environment Research Council (NERC) and the Department for International Development (DFID) under the Future Climate for Africa programme. Working in partnership with tea producers it aims to produce tailored climate information for the tea-producing regions of southern Malawi and western Kenya, and to explore potential adaptation options for supporting medium and long-term planning in the tea sector.

Identified stakeholders in southern Malawi

CI4Tea focuses on Thyolo and Mulanje and works with tea sector stakeholders including (to date):

- Tea Association Malawi
- Tea Research Foundation of Central Africa
- Tea estates: Lujeri and Eastern Produce in Mulanje, and Satemwa, Makandi, Conforzi, Eastern Produce, and Zoa in Thyolo.
- Smallholder farmers' associations - Sukambizi trust, Eastern Outgrowers trust, Msuwadzi and Chisunga.

Research approach

- Stage 1: Engage stakeholders for identifying key climate metrics for tea production and quality
- Stage 2: Analyse climate metrics using state-of-the-art climate models
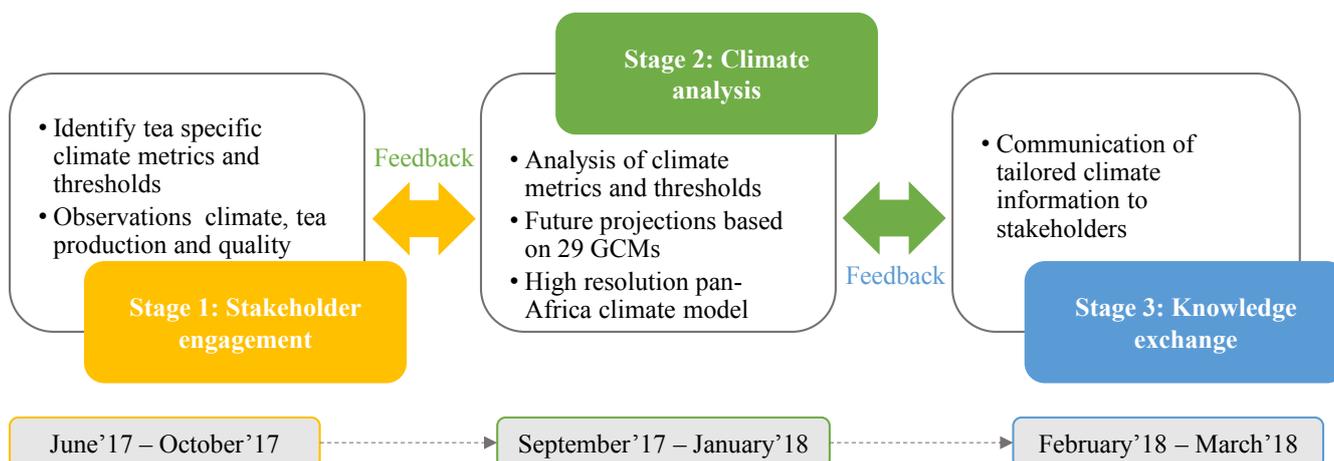- Stage 3: Use stakeholder feedback to tailor climate information for supporting long-term adaptation

Figure 3: Flow diagram of the project stages and their timeline

Climate information at local scale

To understand potential future changes in temperature and rainfall for tea growing regions in Malawi:

- We will use CP-4Africa climate model which provides high resolution information at 4.5km.
- We will also use 29 global climate models at 50km resolution to translate climate information to tea estate scale using long-term climate observations from tea estates (Figure 4).
- We will analyse how particular temperature and rainfall thresholds may be exceeded in the future and provide stakeholders with graphical and descriptive information. For example, the tea plant experiences heat stress above 33°C. Figure 5 shows how the number of days above 33°C during December to April have increased recently at Mimosa station in Mulanje.
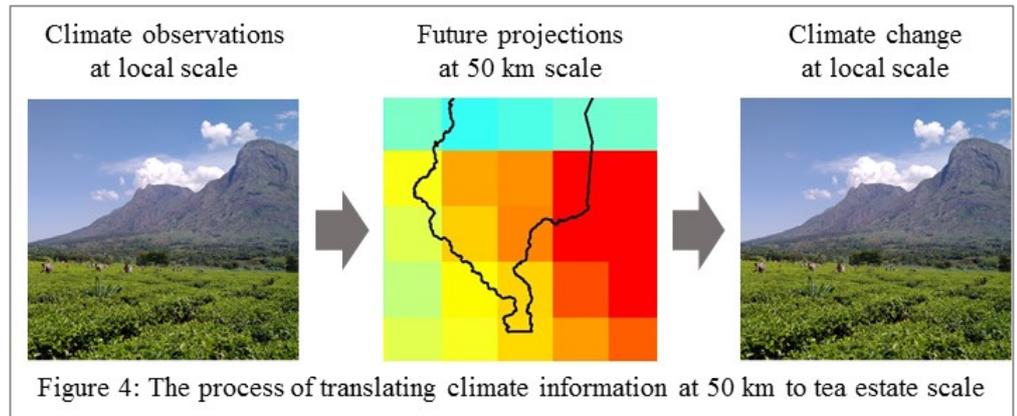- This information will be combined with analysis of

Figure 4: The process of translating climate information at 50 km to tea estate scale
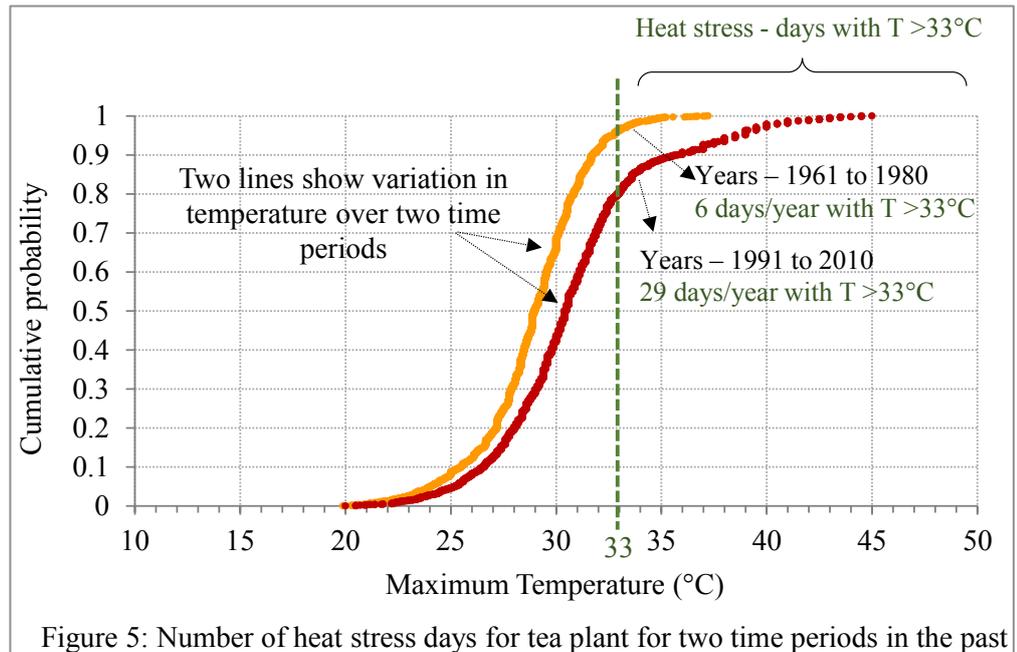
Figure 5: Number of heat stress days for tea plant for two time periods in the past

historical tea production and quality to determine potential impact of climate change on tea production and quality.

Outcomes of CI4Tea project

- Information on how future climate change may affect thresholds of temperature and rainfall in different seasons will help stakeholders better understand how future changes could affect tea production and quality.
- Since information will be generated at the tea estate scale, it will help tea producers identify and prioritise adaptation options for existing, replanted or already irrigated areas.
- The medium and long-term climate information will help stakeholders plan at different time horizons while thinking about low regret, immediate or long-term adaptation options and would help inform imminent policy initiatives such as the Malawi Tea 2020 Revitalization Programme.

Information required for next steps

To produce tea estate scale tailored climate information, we will need:

- Detailed information on key thresholds, climate metrics such as consecutive hot days or rainy days that affect tea production and quality for specific seasons or months through our questionnaire
- Daily long-term (20-30 years) climate observations and daily/monthly production and quality data.

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