RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CGIAR CCAFS

Info Note

The economic case for climate action *in cocoa production*

Adapting cocoa production in Ghana to climate change is a smart investment. Inaction will result in income losses to farmers and the economy.

Key messages

- Adaptation to climate change is often perceived as costly and risky
- Not adapting to climate change will cause income losses to farmers of about USD$410 million per year (about 1% of Ghana's current real GDP)
- More than half of the current cocoa production (470,000 tons per year) is located in zones with high future climate risk
- Ghana's main cocoa-producing region (Western Region) will likely face minor impacts from climate change
- Until 2050s, cocoa production can be sustained in most of the current cocoa-growing regions if adaptation efforts are well coordinated

Stakeholders along the cocoa value chain on the one hand acknowledge the reality of climatic change and the need for action. However, investments into adaptation are limited. This contradicts the scientific consensus that climate change is progressing at a serious pace. Cocoa plantations have a lifespan of several decades and will be exposed to different conditions than today. Today many stakeholders downplay the cost of inaction and proceed with 'business as usual'.

This "Parmenides fallacy" occurs when stakeholders assess the value of an investment in innovation against the present state of the system, as opposed to valuing it against alternative future states. That is, stakeholders avoid investments that anticipate future climate change because the action would not have had positive returns with current (or past) climate conditions. Instead, adaptive action needs to be valued against a hypothetical future in which no action is taken to contain negative impacts and conditions for cocoa degenerate. By providing a benchmark for this cost of inaction we aim to make it easier for cocoa stakeholders to argue in favour of investments in climate change adaptation.

Northwest of the cocoa belt will no longer be suitable for cocoa.

Without adaptation, farmers will give up cocoa or lose their crop to drought.

Annual losses of 60-100%.

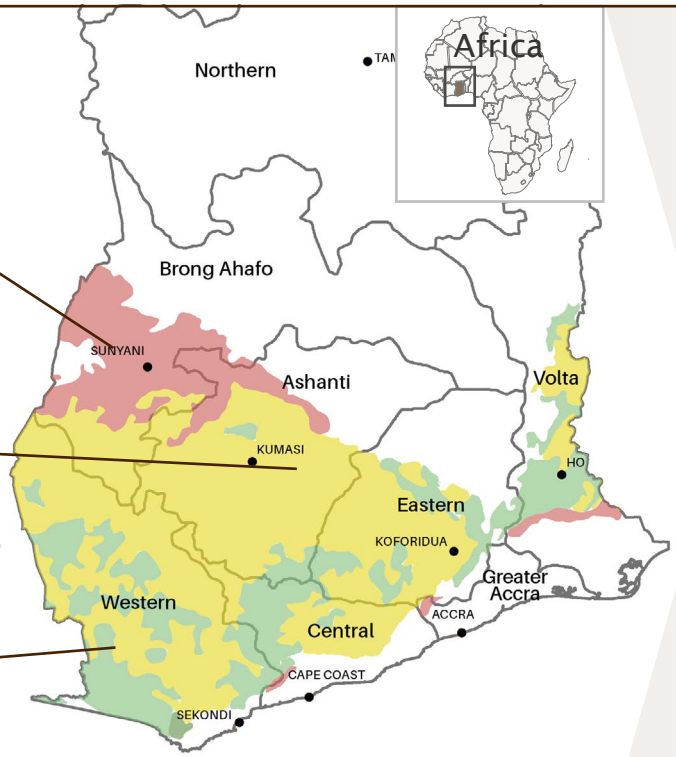
In traditional cocoa regions climate will remain suitable but hazards have to be expected.

Without adaptation, increased pest and disease pressure, and drought cause **losses of 30-50%.**

Western region

Climate will remain highly suitable.

Without adaptation, increased pest and disease pressure causes **losses of 10-20%.**



Cocoa production can only be sustained with a well-directed adaptation effort

820,000MT 550,000MT

Potential losses amount to 1/3 of current production, or 270,000 metric tons.

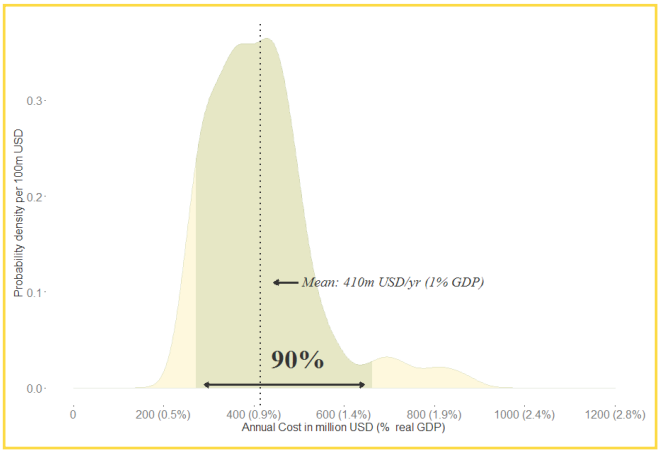
The cost of inaction to climate change

We asked how cocoa producers in West Africa would be affected if the projected conditions of the 2050s hit today. We evaluated the loss of production under 171 impact scenarios that reflect potential climate change trajectories and empirically founded production losses. In our analysis we left total production, number of producers and prices unchanged (using '11-'15 averages), and considered only a change of the climate. We have deliberately chosen to use a simplified approach to not confuse the reader with over-elaborated modelling with many hidden assumptions. While we are aware of the limitations of our study, we decided that clear assumptions about climate impacts would be more helpful to convey a clear message: a failure to act upon climate change will be very costly.

Our method used a Random Forest classification model to evaluate the degree of climate change impacts in Ivory Coast and Ghana by comparing future (2040-69) to present (1950-2000) bioclimatic suitability for cocoa. We considered 19 climate projections from global climate models in a moderate emissions scenario. For each climate scenario we distinguished four impact zones: Cocoa production can either be sustained under low or high adaptation effort (incremental or systemic adaptation) or will become unprofitable such that it needs to be substituted (transformation). In previously unsuitable regions (opportunity) cocoa may become a new option for farmers.

We assumed losses between 10-20% of current production with low impacts caused by high temperatures and changed pests and disease patterns that require adaptation. Higher adaptation efforts will be required where in addition to these hazards drought is threatening production (30-50% losses). Transformation zones will see cocoa plants critically affected and farmers may migrate or invest in other crops (60-100% losses with climate change). In opportunity zones we assumed an opportunity cost of not adapting caused by foregone production on 10-20% of the new area with low (230kg/ha) yields. COCOBOD production data was used to estimate the current subnational distribution of cocoa production. We then overlaid the climate change damage functions. The use of several scenarios resulted in a most likely estimate, and a range of uncertainty.

The expected cost of inaction on adaptation by the 2050s was estimated at 410m USD per year which is about 1% of current real GDP. However, there is considerable uncertainty about future climate conditions and climate damages to unadjusted cocoa. We estimated a 90%-range of 270m-660m USD per year (or 0.7-1.6% of GDP).



The probability distribution was not symmetric and indicated a downside risk of extreme values, i.e. very low cost (e.g. less than 250m USD) are rather unlikely, while very high cost (higher than 570m USD correspondingly) are relatively more likely. Our cost of inaction must therefore be understood as an estimate of the degree of potential cost based on reasonable assumptions.

A full assessment of the benefits of adaptation by the 2050s would require knowledge of future cocoa production and prices. Demand will likely grow in the future and Ghana announced an effort to expand future production. Under these conditions, the true cost of inaction could therefore be even higher and decisive climate action a smart investment.

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