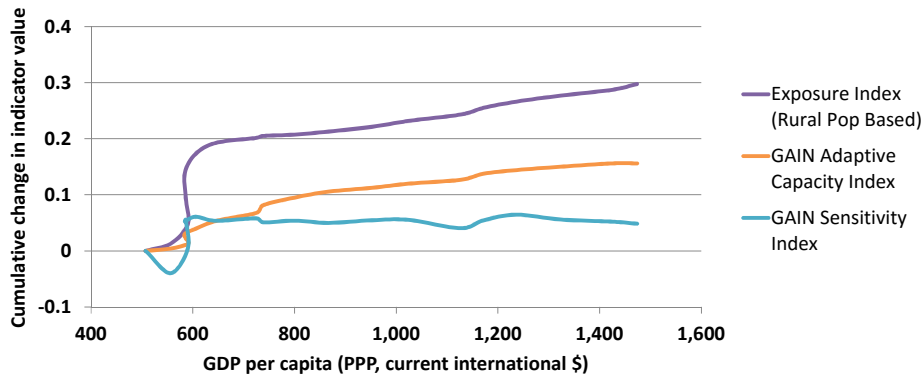


The direction and relative scale of the impacts presented in the scorecard below are subjective judgements based on quantitative data wherever possible. Due to the availability of credible and accurate data, approximations are used for each indicator which may vary by geographical focus or time period and others may draw from qualitative research. A full discussion of analytical constraints is given in the synthesis presentation.

Understanding patterns of climate-resilient economic development Rwanda: A case study

The Rwandan government's agriculture-led development agenda reduced the sensitivity of the sector and built adaptive capacity among its workforce but did little to diversify the economy and the climate risks it faces. Moderate increases in exposure to flood risk from capital investments were outweighed by reductions in sensitivity from productivity gains, soil conservation and irrigation. Economic development contributed to adaptive capacity through poverty reduction and improvements in education and training. This was complemented with risk management policies such as agricultural insurance and disaster planning. However, due to the high economic dependence on agriculture, Rwanda remains vulnerable to climatic variability.



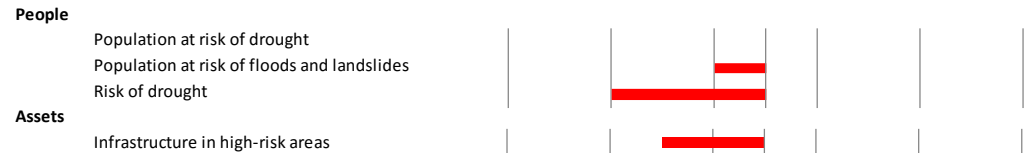
As Rwanda's GDP per capita has grown beyond \$600, an **exposure** index, based on an approximation of people living in areas at high risk of drought, has also steadily increased. **Sensitivity** and **adaptive capacity**, as measured by the relevant components of the ND-GAIN vulnerability index, have, respectively, stayed broadly constant and continued to rise with economic development.

The case study addresses the question: 'What are the linkages between agricultural transformation, poverty reduction, and resilience to climate variability in Rwanda?' over the 2000-2015 period. It drew from desk-based research and fieldwork including the review of technical reports, policy and legal documents, national and international databases and interviews.

Change in resilience due to change in indicator

EXPOSURE

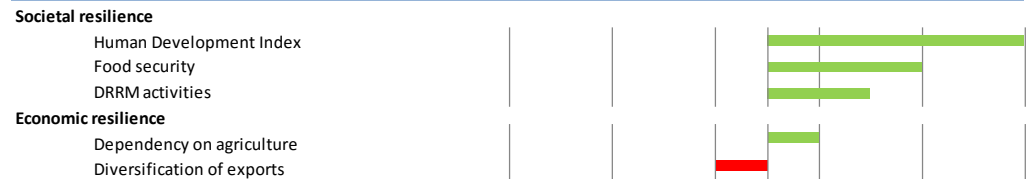
The presence of people and assets in places that could be adversely affected by climate change.



There was little overall change in the population in areas at a relatively high risk of drought, which are mostly rural, as high rates of urbanisation were offset by strong rural population growth. While not attributable to economic development, average rainfall decreased over the period increasing the likelihood of droughts. Those who have migrated from the semi-arid East will be exposed to new risks of floods and landslides in urban centres. A pilot resettlement programme was established to tackle flood risk but remains small-scale. Significant investments in both soil conservation and irrigation infrastructure were concentrated in the South and were also exposed to landslide and flood risk as a result.

SENSITIVITY

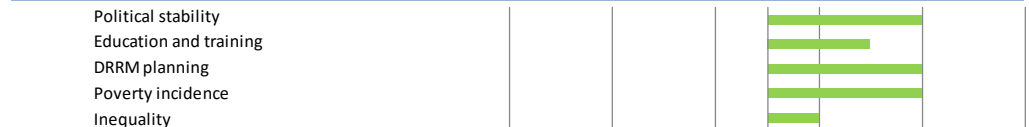
The degree to which a system is affected by or responsive to a climate stimuli.



Public efforts to transform the agricultural sector led to substantial productivity gains and output growth, doubling calorie production per person. This strengthened food security and reduced sensitivity by providing a buffer to climatic impacts. However, this has made Rwanda's export base more reliant on agriculture despite a recent decline in the revenue share of food due to falling food prices relative to minerals. Significant improvements in the Human Development Index reflected broad improvements in standards of living reducing the health impacts of a climatic disaster. Disaster risk reduction and management (DRRM) activities included terracing, irrigation, mitigation of soil erosion, increased fertiliser use and the introduction of more climate-resilient seed varieties.

ADAPTIVE CAPACITY

The potential or capability of a system to adapt to, or alter to better suit, climatic stimuli or their effects or impacts.



Rising incomes and moderate decreases in inequality, as measured by the share of income earned by the poorest quartile, contributed to a reduction in poverty and an increase in adaptive capacity. Measures of political stability improved over the period suggesting an increased ability to design and implement co-ordinated (climate) policies. An increase in the tertiary enrolment rate, an indicator of educational development, also signalled improved adaptive capacity in addition to the creation of training programmes for farmers on climate resilience. This was complemented by efforts to institutionalise DRRM through establishing food stores, early warning systems, support programmes for climate-smart agriculture as well as assigning responsibility for climate risks among government Ministries.



Are impacts different for the poorest?

The poorest have seen some of the largest improvements in climate resilience in Rwanda. In addition to poverty reduction, progress has been made in terms of health, education and gender equality, **helping to improve both sensitivity and adaptive capacity.**

Although poverty rates are high at 45 per cent, the average consumption growth rate from 2000-2011 was higher for the poorest: 4.8 per cent for the poorest 10 per cent of the population, 4.0 per cent for the second poorest and 3.6 per cent for the richest. This is partly due to the integration of social welfare policies with agricultural interventions that target marginalised groups – the poorest, landless and women – and provide sources of income, assets and skills. These factors **provide women and the poorest with the tools needed to build their resilience and adapt to climate variability.**

However, more women than men work in subsistence agriculture and **they are diversifying into alternative livelihoods at a slower rate, indicating that women are still more climate-sensitive than men.** Evidence suggests that societal norms are preventing targeted agricultural programmes from generating significant benefits for women.



Are impacts locked in?

Irrigation and terracing infrastructure may cause physical lock-in as they have high fixed capital costs and long lifetimes. **While worsening exposure to floods and landslides, if maintained and managed effectively, these investments could reduce the sensitivity of the agricultural sector.** However, mismanagement can result in soil loss and nutrient leaching of terraced land, and irrigation infrastructure can displace other uses for scarce water resources.

Policies prioritise crops that are in demand in the region but are also more sensitive to climate variability than traditional crops. As the market is characterised by a high degree of risk aversion for untested seeds, a lack of choice among crop varieties and poor certification, **this may lead to economic and political lock-in of increased sensitivity.** A more efficient market supported by publicly available research and innovation may help correct this issue.

Economic lock-in of increased sensitivity may also occur through ongoing dependence on agriculture compounded by a concentration of public sector investment. However, the government is taking notable steps to reform the business environment and encourage growth of alternative sectors such as mining and tourism.



What are the policy implications?

If the most vulnerable groups in society disproportionately work in a specific sector, supporting that sector is an effective method to build their climate resilience. Rwanda is an example of where economic and climate policy incentives align. Increased productivity in and commercialisation of the agricultural sector supported broad-based economic growth and poverty reduction. Technology and process improvements directly reduced the sensitivity of workers' (often women and the poorest) livelihoods and indirectly improved their adaptive capacity through rising incomes. In this way, standard economic development policy has helped to build climate resilience.

However, this case study also shows that there are trade-offs between policies that promote economic development and those that aim to increase climate resilience. For example, the more support offered to a specific sector, the more likely the economy will become dependent on that sector. This can create instances of economic and political lock-in if that sector is particularly sensitive to climatic impacts - as is the case with agriculture in Rwanda. Sector support policies that are time limited, have an exit strategy and exist within a wider, cross-sectoral and integrated policy programme are less likely to cause such negative lock-in.