

Protected Areas Resilient to Climate Change, PARCC West Africa



2015

Climate Change and Ecosystem Services Fact Sheet: Sierra Leone



ENGLISH



Andrew Hartley, Richard
Jones and Tamara Janes
Met Office Hadley Centre,
2015

The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is the specialist biodiversity assessment centre of the United Nations Environment Programme (UNEP), the world's foremost intergovernmental environmental organisation. The Centre has been in operation for over 30 years, combining scientific research with practical policy advice.



Climate Change and Ecosystem Services Fact Sheet: Sierra Leone, prepared by Hartley, A., Jones, R. and Janes, T., with funding from Global Environment Facility (GEF) via UNEP.

- Copyright:** 2015. United Nations Environment Programme.
- Copyright release:** Reproduction of this publication for educational or other non-commercial purposes is authorised without prior permission from the copyright holders.
- Reproduction** For resale or other commercial purpose is prohibited without the prior written permission of the copyright holders.
- Disclaimer:** The contents of this report do not necessarily reflect the views or policies of UNEP-WCMC or contributory organisations. The contents of this report do not necessarily reflect the views or policies of the Secretariat of the United Nations Environment Programme Global Environment Facility and/or any of their organs, officers, employees and agents.
- Citation:** Hartley, A., Jones, R. and Janes, T. **2015.** Climate Change and Ecosystem Services Fact Sheet: Sierra Leone. Met Office Hadley Centre and UNEP-WCMC
- Available From:** UNEP-World Conservation Monitoring Centre (UNEP-WCMC)
219 Huntingdon Road, Cambridge CB3 0DL, UK
Tel: +44 1223 277314; Fax: +44 1223 277136
Email: protectedareas@unep-wcmc.org
URL: <http://www.unep-wcmc.org>

Photo cover: River Number Two beach, Freetown Peninsula, Sierra Leone. *Copyright:* Elise Belle.

UNEP promotes environmentally sound practices globally and in its own activities. This publication is printed on 100% recycled paper, using vegetable-based inks and other eco-friendly practices. Our distribution policy aims to reduce UNEP's carbon footprint.

Table of Contents

INTRODUCTION.....	4
CLIMATE PROJECTIONS.....	5
ECOSYSTEM SERVICES.....	6
PILOT SITE	7
ADVICE FOR NATIONAL PLANNING.....	7

Introduction

To assist West African protected areas in building their resilience to climate change, the PARCC-WA project has assessed future climate impacts of land use change on ecosystem services in Sierra Leone. This includes applying five spatially detailed regional climate model projections developed for the project and three scenarios of future land use change.

This fact sheet summarises the main features of projected climate impacts on ecosystem services and their implications for focus project areas in Sierra Leone and future national planning. Findings from the latest assessment report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) are referred to in order to provide guidance on the way to interpret these results – which should be viewed either as:

(a) Results we have *high confidence* in because of high agreement between the models and a physical understanding of the projected change; or

(b) *Plausible* results we cannot exclude as being wrong, but which we have low confidence in due to lack of consensus between the model projections.

Climate Projections

- The projections for mean annual temperature in Sierra Leone for the end of the 21st century are for significant increases (high confidence):
 - From the PARCC regional climate projections: increases of 2.5-4 °C
 - From global climate models assessed in IPCC AR5: increases of 1.5-3.5 °C
- Projections for wet season (July-August-September) total precipitation used in the project are considered plausible/low confidence:
 - From the PARCC regional climate projections: changes of +7 to +20%
 - From global climate models assessed in IPCC AR5: changes of -15 to +20%
- Within the regional climate model projection results:
 - Highest temperature increases are expected furthest inland due to the greater distance from the regulating influence of the ocean.
 - Generally, larger precipitation increases are projected at or near the coast, with smaller increases or slight decreases projected further inland.

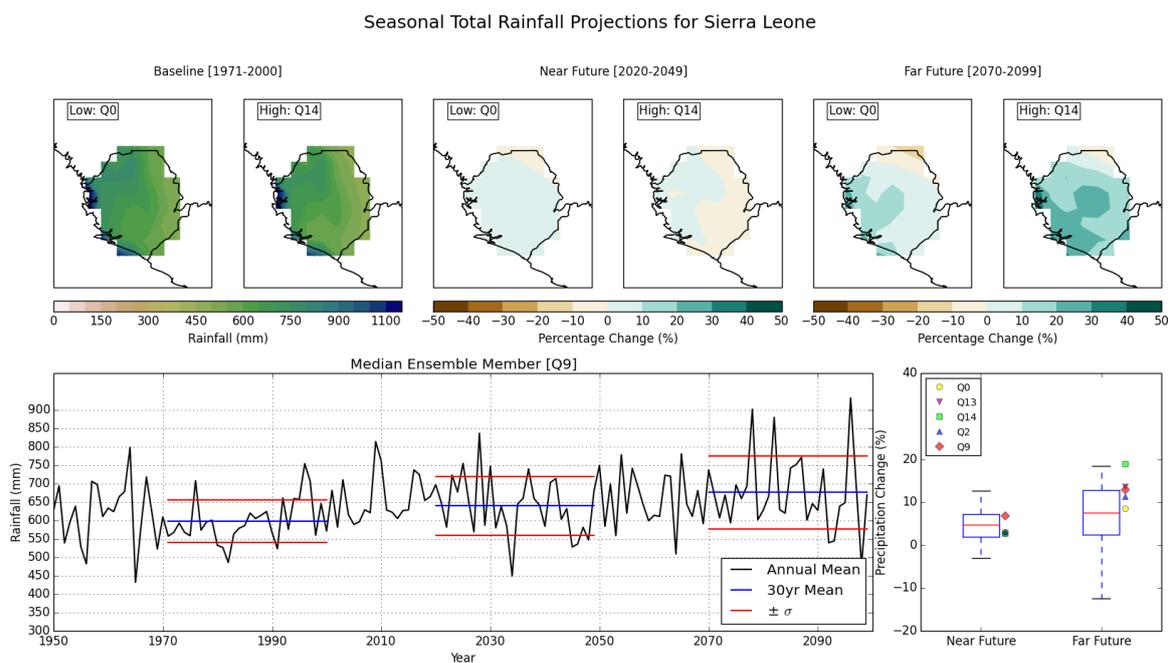


Figure 1. Precipitation projections for Sierra Leone. (Top 6 panels) Seasonal total rainfall (mm) in the JAS season, for the baseline period (1971-2000), and projected changes for the near future (2020-2049) and far future (2070-2099), for the RCM models with the lowest and highest sensitivities in the far future time period (for Sierra Leone, these are Q0 and Q14 respectively). (Bottom left panel) Evolution of JAS seasonal total rainfall from 1950-2100 for the median ensemble member of the five models (Q9), as well as the 30-year mean and associated standard deviations for the baseline, near and far future periods defined above. (Bottom right panel) Projected percentage changes for JAS seasonal total rainfall, for the near and far future time periods, for the five RCM experiments as well as 18 CMIP5 GCM experiments using RCP6.0.

Ecosystem Services

- Increases in the fraction of broadleaf tree cover are projected to occur throughout Sierra Leone as a result of the projected temperature increases, although human disturbance projected in future land-use scenarios would restrict this increase (high confidence)
- Vegetation productivity is also projected to increase as broadleaf tree cover increases, and consequently vegetation carbon storage increases. This is related to increases in minimum temperature, since photosynthesis is not limited by water availability in this region (high confidence)
- There is a large variability in the projections of change in surface runoff with the possibility of an increase towards the end of the century (plausible)

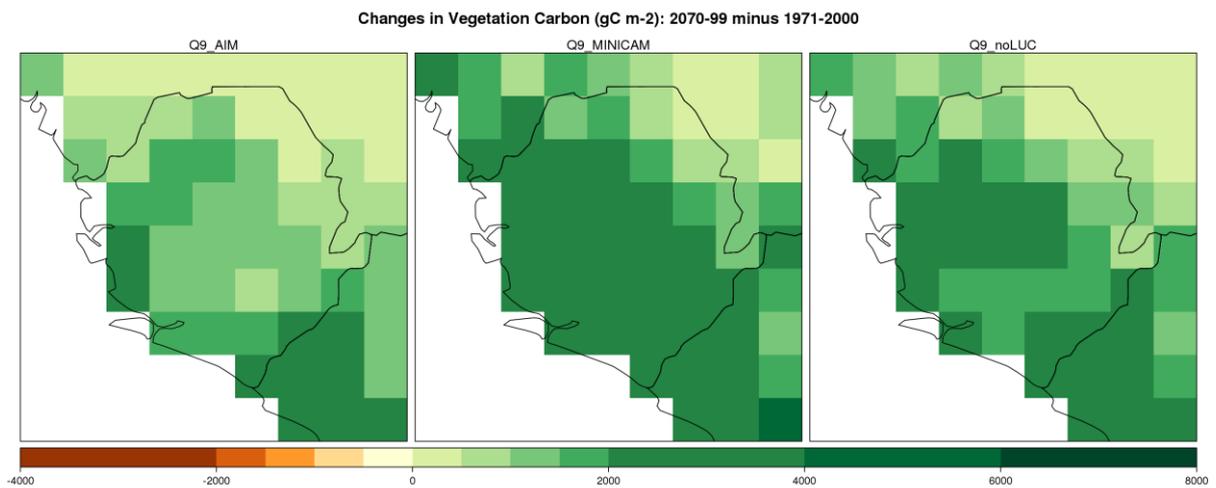


Figure 2. Changes in above ground vegetation carbon storage for the median ensemble member (Q9), and three land use scenarios for Sierra Leone.

Pilot Site

- Similar to the rest of the country, in the proposed Gola Rainforest National Park, transboundary with the Gola Forest National Park in Liberia, there is a projected increase in the fraction of broadleaf tree cover, and an increase in the amount of carbon stored in the vegetation (related to temperature; high confidence)

Advice for National Planning

- Indications are that tropical forest in Sierra Leone will become an even more valuable resource for storing carbon in the future, and therefore contributing to mitigation of global climate change. However, including scenarios of future land use shows that human disturbance would significantly reduce this potential and so minimising this would maximise the mitigation potential of the projected increase in forest carbon storage.
- Given the potentially high impacts to the population of Sierra Leone, despite the projections for an increase in surface water runoff in the far future being regarded as low confidence, these are still a plausible outcome and thus should be considered in planning for the future.