Climate Change projections and impacts in SADC (with focus on Mauritius) and importance of climate services for agriculture

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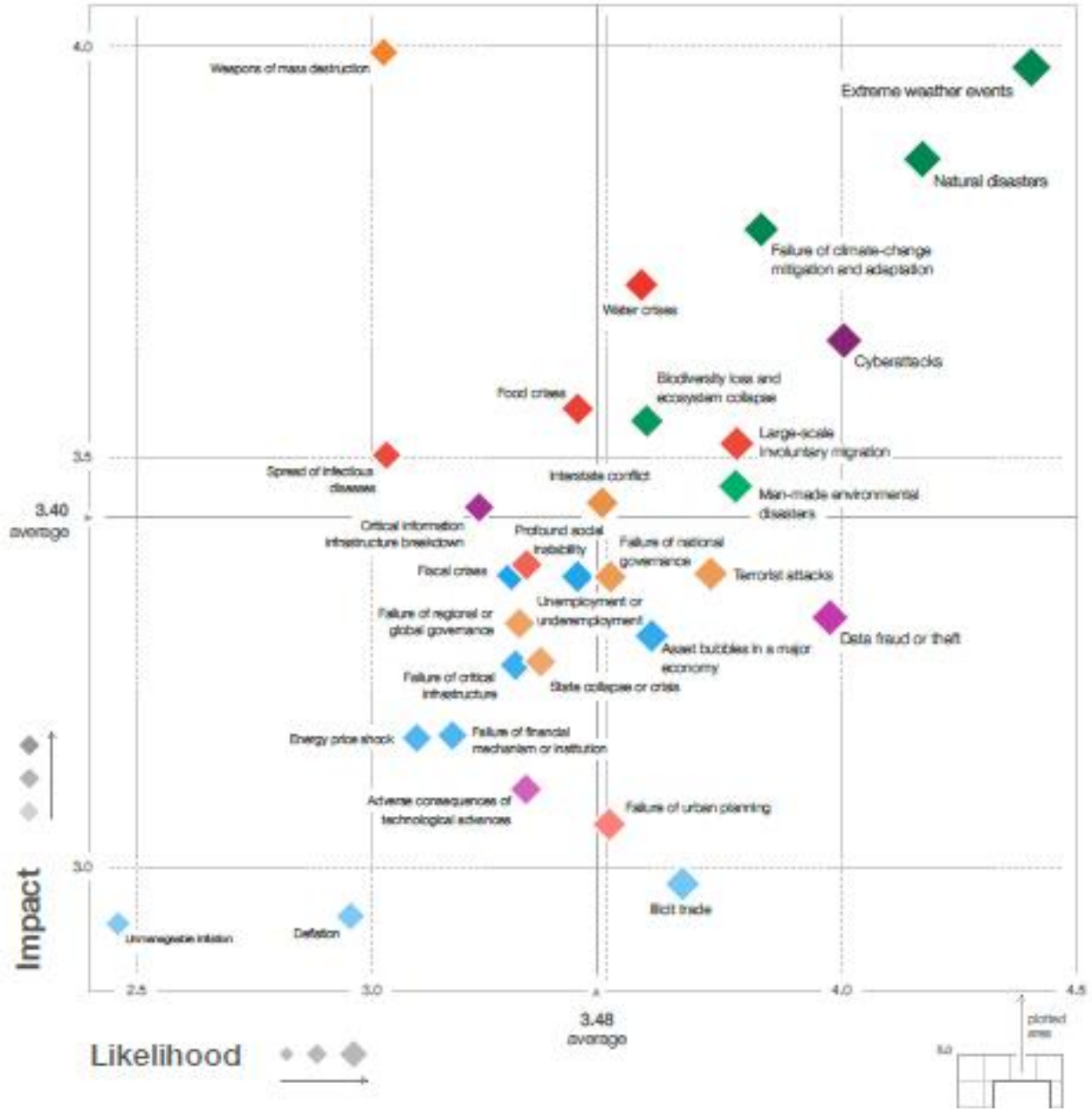
Global Climate Change

- During the second half of the twentieth century, global food supply and distribution developed rapidly, and was beginning to keep abreast of population growth, thus moving towards a more food secure future for many countries.
- But the last decade has seen a rapid reversal of these gains. Accelerating food demand, competition for depleting resources, and the failing ability of the environment to buffer increasing anthropogenic impacts are posing significant challenges.
- Climate change is one among a set of interconnected trends and risks facing agriculture and food systems.

Figure I: The Global Risks Landscape 2018



Climate in Southern Africa

- Southern Africa enjoys a multitude of different climates, ranging from the tropical rainforest of the DRC to the deserts of Namibia and Botswana.
- Several distinct climatic zones have been identified over its millions of square kilometres, each with its own specificities.
- While the distinct climatic zones in and across the different countries in this region operate discretely, they also experience climatic effects that influence the region as a whole.

Climate Change in Southern Africa

- Southern Africa has always been among the regions in the world most affected by extreme shifts between droughts and floods. With climate change progressing, this phenomenon is increasing, because Southern Africa is uniquely susceptible to the impacts of a changing climate.
- The region is expected to experience higher land and ocean surface temperatures than in the past, which will affect rainfall, winds, and the timing and intensity of weather events.

Climate Change in Southern Africa

- Climate change presents unique challenges and risks to this region in the present context of its rapid economic development, and the realisation of its potential in terms of agricultural and non-agricultural land, fossil fuels, minerals, biodiversity, marine resources and its human capital.
- Increased frequency of floods, cyclones, and droughts may damage infrastructure, destroy agricultural crops, disrupt livelihoods, impact human and animal health, and cause loss of life.
- SADC countries' vulnerability to climate change is caused by the interaction of climatic changes with social, economic, and other environmental factors.

Impacts of Climate Change on Agriculture and Food

- Changes in crop phenology;
- Reduced crop and animal yields due to higher temperatures, erratic rainfall, increase in pests and diseases,
- Reduction in soil health and fertility;
- Destruction of coastal agriculture due to sea level rise and soil salinisation;
- New and resurging crop and animal pests, parasites and diseases;
- Loss in agrobiodiversity;
- Natural disasters, such as floods, droughts, cyclones, torrential rains, etc., affecting
- All activities of pre-production, production and post-production activities are affected directly and indirectly;
- Destruction of livelihoods, and increasing poverty, thereby affecting the ability of the population to cope with climate-related shocks;
- Reduced labour due to the disease burden of HIV and AIDS, exacerbated by new and re-emerging diseases;
- The increasing financial and social burden of climate refugees.

Role of Southern African Development Community (SADC) in CC Issues

- SADC has developed, and is coordinating, a weather and climate monitoring programme aimed at encouraging all of its 16 Member States to cooperate with each other towards the common goal of regional security and stronger regional integration.
- In 1990, the SADC Climate Services Centre (CSC) was created on the foundation of the earlier Regional Drought Monitoring Centre.
- The main objective of the CSC is to reduce negative impacts from climate extremes, such as droughts and floods.

SADC Climate Services Centre (CSC)

- The CSC generates medium-range (10 to 14 days) and long-range (three to six months) climatic outlook assessments that are disseminated to all Member States, and to local communities in each Member State by their respective Meteorological Services.
- Early Warning Units were established in 12 Member States to collect, analyse, and disseminate early warning information covering seasonal rainfall and crop development, harvest forecasting, import and exports, food stocks, price and market monitoring.
- This information is published regularly at regional as well as national and subnational levels.

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06 January, 2017

Issue no. 03

OUTLOOK FOR JANUARY– FEBRUARY—MARCH 2017 UPDATE

HIGHLIGHTS

Inside this issue:

GLOBAL SST FORECAST

- The El Niño–Southern Oscillation (ENSO) remains neutral—neither El Niño nor La Niña.
- Negative sea surface temperature (SST) anomalies over equatorial Pacific Ocean are close to long-terms average in early January 2017.
- Positive SST anomalies are observed over the southern Indian Ocean and negative SST over central parts.
- The Indian Ocean Dipole remains neutral.

OCTOBER – DECEMBER 2016 RAINFALL HIGHLIGHTS

- Since late November, the southern African summer monsoon has continued to be dominated by a dipole pattern: with suppressed rainfall in the northeastern parts of the region and Island of Madagascar, and enhanced rainfall in the southern parts of contiguous SADC .
- Some significant above-normal rainfalls conditions were observed last past 30 days, across portions of northwestern DRC, west and south of Namibia, Botswana, Zimbabwe and south Mozambique.

JFM 2017 UPDATE RAINFALLS OUTLOOK SUMMARY

For the period January to March 2017, there will be below-normal rainfall conditions over eastern DRC, Tanzania, extreme northern Zambia, Malawi, Mozambique and Madagascar.

Meanwhile, there will be greater likelihood of normal to above normal rainfall over southern parts of Zimbabwe and Mozambique, northern South Africa, eastern Botswana and Swaziland and Lesotho. Largely consistent previous projections from SARCOF-20.

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Food Security Early Warning System

Agromet Update

2017/2018 Agricultural Season

Issue 01 Month: October Season: 2017-2018 23-11-2017

Highlights

- Onset of seasonal rains is delayed in parts of South Africa and Lesotho
- Rainfall season has started on time in northern parts of the region, and most other areas are expected to experience onset of rains in November
- Integrated pest management strategies have been recommended for countering fall armyworm outbreaks

Regional Summary

The northern parts of the region have experienced good rains since October, and most areas now have near-normal to above normal rainfall totals (Figure 1, green colours). Areas where above normal rains were received include much of Angola and DRC, north-eastern Zambia, western and eastern Tanzania, and central Madagascar. In many of these northern areas, the seasonal rains normally start in September and October.

Most southern and central parts of the region typically experience an onset of rains in November. The exception to this is the eastern parts of South Africa, and some parts of Swaziland and Lesotho, and central Madagascar, where seasonal rains typically start in October. In these early-starting south eastern areas, rains have so far been below average (Figure 1, yellow and brown colours). In contrast, good rains were received earlier than usual in central Mozambique and eastern Zimbabwe in early November.

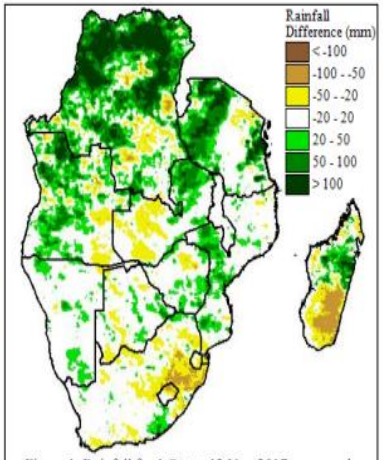

Figure 1. Rainfall for 1 Oct to 12 Nov 2017 expressed as difference from average rainfall for the same period.

Climate Change in Mauritius

- Average temperatures have risen by 0.74^{o}C over mainland and 1.1^{o}C over Agalega, compared to the 1961-90 mean.
- Rainfall is becoming more erratic.
- Overall precipitation has decreased by 8% between 1950 and 2008.
- Longer periods of drought in Rodrigues.
- Frequency of extreme climatic events is increasing.
- Cyclones are intensifying much faster.
- Increase in the annual number of hot days and warm nights.
- Between 1998 and 2007, local mean sea level rose by 2.1mm per year. Over the last 5 years sea level has been rising by around 3.8 mm/year. Agalega, in particular, is very vulnerable to sea level rise.

Climate Change Impacts in Mauritius

- Mauritius is classified as the country with the 13th highest disaster risk and is the seventh most exposed to natural hazards (World Risk Report, 2017).
- Worst drought in 1999 and 2011.
- Flash floods in 2008 and 2013, resulting in loss of lives.
- Coral bleaching and accentuated beach erosion.
- Erosion has shrunk the width of some beaches by as much as 10m over the past eight years.
- Sea levels, increasing at an average rate of 5.6mm a year, along with the deterioration of the coral reefs, could reduce tourism revenues by up to $50m a year by 2050.


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Projected impacts of climate change in Mauritius

- Increase of mean annual temperatures of upto 3.8°C by 2100.
- Utilizable water resources will decrease by up to 13% by 2050.
- Increase in duration of dry spells.
- Increased risk of flash floods.
- More frequent heat waves in summer.
- Increasing frequency of heat spells, giving rise to health problems, e.g. cardiovascular and pulmonary complications.
- Heat stress effects on productivity on livestock and poultry.
- Greater damage due to more intense cyclones.
- Increased events of high energy waves (tidal surge) impacting the shores of Mauritius.

Projected impacts of climate change in Mauritius

- Increased propagation of vector-borne and infectious diseases of humans, crops and animals, as a result of higher temperature and recurrent floods.
- Lengthening of the transmission period of important vector-borne diseases due to rise in temperature.
- Live corals reduced by 80-100% in the event of 3.28oC rise in temperature by the year 2100.
- Migratory shifts in tuna aggregations thereby disrupting the local seafood hub activities and other fish based industries, resulting in conflicts over the stock both at a national and international level.
- Changes in fish stock distribution and fluctuations in abundance of conventionally fished and “new” species may disrupt existing allocation arrangements.

National Emissions

- In 2014, the total greenhouse gas (GHG) emissions for the Republic was approximately 5.1 million tonnes of CO2 equivalent, up from 4 .8MtC02e in 2010.
- This represents just 0.015% of global emissions in 2010.
- In terms of absolute emissions, Mauritius ranks 128th out of 216 states and territories.
- BAU scenario gives a projection of 7 MtCo2e in 2030.

Climate Resilience

- In order to address climate change threats, the Republic of Mauritius is developing a pragmatic approach to develop its resilience.
- Mauritius is developing an early warning system that will give three days notice of possible storm surges and improving its capacity to evacuate people from vulnerable areas.
- Mauritius was among the first to ratify the 2015 Paris Agreement on climate change and has pledged to cut its carbon emissions by 30% by 2030 by making use of solar, wind and wave energy.

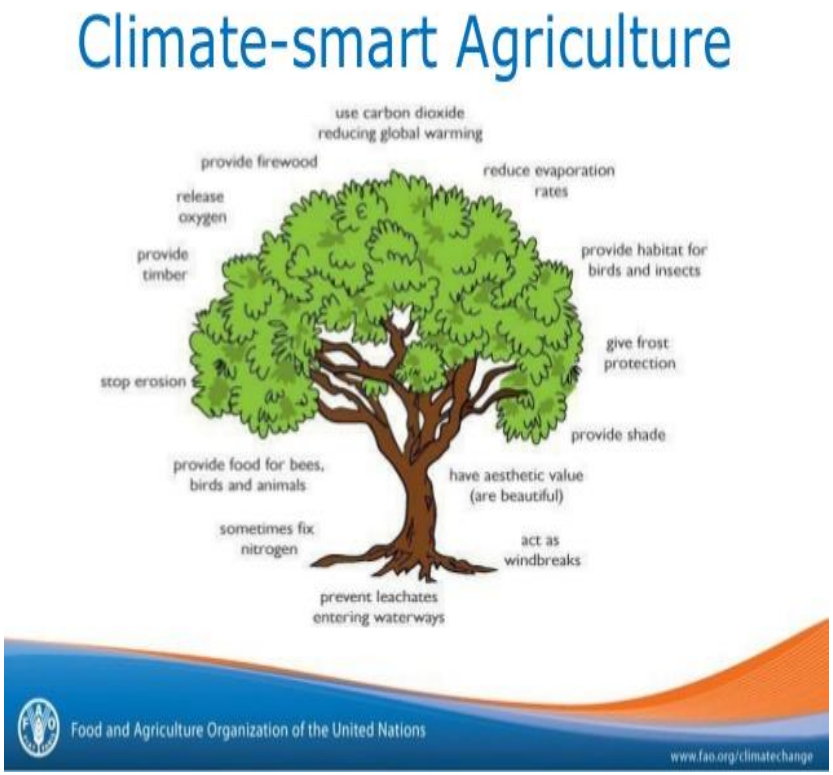
Mauritius' Technology Action Plan for an enhanced Climate Change Adaptation and Mitigation proposes the following measures

Sector	Technologies
Adaptation	
Agriculture	a) up-scaling of proven Integrated Pest Management technologies focusing on all food crop growers b) Micro-irrigation focusing on small scale growers of horticultural crops.
Water	a) Rainwater Harvesting at Residential level (RWH), b) Hydrological Models (HM) and c) Desalination Technology in the hotel sector (Desal).
Coastal Zone	a) Dune and vegetation restoration b) Rock Revetments c) Wetland Protection
Mitigation	
Energy Industry	a) utility-scale wind energy, b) industrial and commercial waste heat recovery using boiler economizer

Climate Change Division

- Climate Change Information Centre (CCIC)
- Agricultural Decision Support System (ADSS)
- National Climate Change Adaptation Policy Framework for RoM
- Toolkits for various sectors
- Various documents on CC ICKM.

Climate Smart Agriculture



- Agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible, and enhances achievement of national food security and development goals.
- The principal goal of CSA is identified as food security and development, while productivity, adaptation, and mitigation are the three interlinked pillars necessary for achieving this goal.

CSA related activities at FoA

- Large amount of research and consultancy work has been done, and is ongoing, at FoA on various aspects of CSA.
- Forms part of the teaching of formal award undergraduate and postgraduate programmes.
- Short training courses organized in Mauritius and Rodrigues.

A COMPREHENSIVE SCOPING AND ASSESSMENT STUDY OF CLIMATE SMART AGRICULTURE POLICIES IN MAURITIUS

30 April 2014

By

National Consultant: Prof Sunita Facknath

Collaborators: **Assoc Prof Bhanooduth Lalljee**
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University of Mauritius

April 2014

Commissioned by

The Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN)

A Comprehensive Scoping and Assessment Study of Climate Smart Agriculture Policies in Mauritius

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Introduction

Climate variability and climate change is one of the most important challenges facing development in Africa. The Republic of Mauritius, in common with other Small Island Developing State (SIDS), is highly vulnerable to climate change due to the high risk of sea level rise (sea level has risen by 7.8 cm at Port Louis and 6.7 cm at Rodrigues, compared to the 1950 levels), impacts of increasing temperatures (by about 0.16°C per decade), uncertain rainfall (rainfall has decreased by about 100 mm over the last 50 years, and there are longer dry periods), higher incidence of extreme weather events (more frequent and/or more intense cyclones, flash floods, high waves), and the limited capacity to deal with these changes.

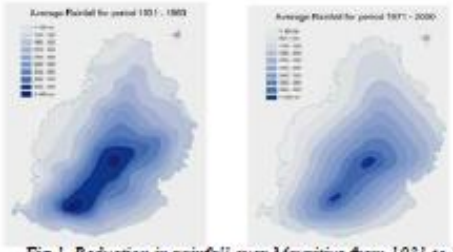

Fig 1. Reduction in rainfall over Mauritius from 1931 to 2000 (Mauritius Meteorological Services)

Higher temperatures and reduced precipitation will impact negatively on type and amount of food produced, on the health and wellbeing of the people, on livestock and other animals, and on the natural and built environments. Sea level rise will flood low-lying areas, making them inhabitable and unsuitable for agriculture. The incidence of pests, diseases and parasites on crops, livestock animals as well as on humans will increase. The reduction in crop yield may lead to abandonment of agricultural land, with further negative consequences such as soil erosion, loss of soil fertility, land degradation, increased sediments in the lagoon, etc.

Climate–Smart Agriculture (CSA) is not a specific technology or practice; it is an approach that incorporates technology, policy and financing options in a holistic and coherent manner.

In order to meet these, and the related challenges of food security and sustainable livelihoods, agriculture must be made more "climate-smart".

Teknologi Agricol Pou Adapte o Sanzeman Climatik dan Rodrig

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et

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Avril 2014

Sustainable Agricultural Technologies for Climate Change Adaptation in Rodrigues, Republic of Mauritius

Assoc Professor B. Lalljee
and
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Faculty of Agriculture,
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April 2014

Few Examples of CSA Projects at FoA

1. Transformation of local agriculture into CSA. **EU**.

2. Documentation of proven practices, ICT tools and policies to help farmers address climate change. **ACP-CTA.**

3. Developing decision support simulation tools based on scientifically validated indigenous/traditional and conventional knowledge for increasing agricultural production and food security in Africa in the context of a changing climate. **AU**. 2013-2107.

4. Global Islands' Vulnerability Research, Adaptation, Policy and Development (GIVRAPD). University of Oxford. **DFID/CDKN**. 2011-2014.

5. A study of Climate Smart Agriculture practices and technologies adopted by small farmers in response to climate change in Mauritius. **UoM**. 2014.

6. Situational analysis of climate change adaptation in Mauritian agriculture. **UoM**. 2011-2012.

7. Several projects on waste to wealth. AAP for CC, MRC, **UoM**.

8. Several projects on soil health and fertility management. EU, IAEA, MRC, **UoM.**

9. Several projects on sustainable crop protection measures. EU, MRC, **UoM**.

10. Carbon sequestration studies of the Integrated Development projects, e.g. Cote d'Or. **Private sector**.

Capacity building and other activities

Regional MSc in Climate Change and Sustainable Development programme. Funded by DFID and Coordinated by SARUA.

Agromet & CC module in all agriculture related programmes.

Ongoing BSc (Hons.) in Sustainable Agriculture and Food Security.

Short training courses for farmers in Mauritius and Rodrigues on SA.

Contributed to the INC, SNC, TNC, INDC, GHG Inventory, and other national documents, strategy and action plans, etc.

Conclusion

- Lot is being done. But given the scale of the direct and indirect impacts of climate change on all aspects of our lives, it is a drop in the ocean.
- We still have lots to do.
- We need to unify our efforts towards this common goal.

We have only one planet !

Thank you for your attention!