**Pacific Small Island Developing States (Pacific SIDS) submission on future topics not listed in decision 4/CP.23 and views on the progress of the KJWA in order to report to the Conference of the Parties as indicated in Decision 4/CP.23, paragraph 4.**

The Republic of Fiji welcomes the opportunity to make this submission on behalf of the Pacific Small Island Developing States (Pacific SIDS). This submission provides the Pacific SIDS views on future topics not listed in decision 4/CP.23 and views on the progress of the Koronivia Joint Work on Agriculture (KJWA) in order to report to the Conference of the Parties as indicated in Decision 4/CP.23, paragraph 4.

## A. Introduction

The agricultural sector including forestry, is of vital importance in Pacific nations. Crop production is the most important sector in Melanesia, where it is the main source of employment, and also important in Polynesian countries like Samoa and Tonga, and Micronesian countries like Kiribati, and FSM (SPC, 2011[1]). Subsistence food production forms a significant part of household income, and more than 50% in some countries, although it varies widely among and within countries.

The traditional agricultural systems are combinations of sequential cropping and intercropping[2]. Usually a piece of land is cleared by slash and burn or by ploughing, and then planted with a succession of root crops. In some of the cropping patterns, root crops are grown in a sequence and relay intercropped with tall-growing crops like *Alocasia*, plantain/banana (*Musa* spp.), other fruit trees, kava (*Piper methysticum* Forst.) and paper mulberry (*Broussnetia papyrifera* L.). These structurally complex agro-forestry systems buffer crops from large fluctuations in temperature, keeping crops at closer-to-optimal growing conditions, and protect crops from extreme storm events.

It is important to note that since the 1990s, food production per capita has declined in all countries (SPC 2011). The causes of the decline include socio-economic factors such as population increase and urbanization, ownership and decision on use of land, increasing consumption of imported foods, and rising global food prices; and biophysical factors such as declining soil health, increasing incidences of pests and diseases, loss of biodiversity, decreasing livestock productivity, food waste, and the need to build capacity of land use stakeholders in integrated food production systems. Climate change is accentuating the effects of these causes.

## B. Future Topics

Based on the brief contextual background provided above, the Pacific SIDS agreed that the future topic they want to address is *"How to achieve integrated resilient food production systems in the Pacific SIDS".* Since many of the Pacific SIDS have poor institutional capacity, external technical and financial support for their efforts to improve resilience of their food production systems will be needed. Leading up to this submission, the region has had a number of workshops on soil organic carbon management and improved nutrient use. Countries identified their agricultural aspirations, priority needs and the future topics to be included in this submission. This submission also draws on national climate change circumstances and current works on climate change adaptation and mitigation in the countries. The Pacific SIDS therefore submit the following as high-priority topics for the KJWA.

### *i. Vulnerability of communities and food production systems assessed*

Most countries agreed that this work should endeavour to improve the knowledge and skills of agricultural stakeholders in assessing their vulnerability to climate change. The consensus was that

[1] SPC. 2011. Food Security in the Pacific and East Timor and its Vulnerability to Climate Change. Paper prepared for the Australian Government Department of Climate Change and Energy Efficiency

[2]Halavatau, S.M and M. Asgher. 1989. Land Use and Conservation Farming in Tonga. Alafua Agricultural Bulletin Vol14, No.3, pp 41 – 47

adaptation means people and we need to build capacity of people. This will be done with a combination of technical tools (like models) and community-based vulnerability assessment tools. In terms of modelling, the University of the South Pacific is leading this, supported by the Australian Centre for International Agricultural Research (ACIAR). With community-based vulnerability analysis, the Pacific Community (SPC) Land Resources Division (LRD) led some of this work in some of the Pacific SIDS and has recently produced and published a manual on Community-based vulnerability analysis to climate change. Strong emphasis is needed to include different landscape scales such as water-catchment, ridge to reef and whole of island in community-based vulnerability assessments. Agriculture-specific indicators such as soil health, production index, access to land and food security are needed to be included in determining vulnerabilities of the agriculture sector. Agencies working in this area in the Pacific include the University of the South Pacific, FAO, SPC and SPREP.

### *ii. Improved soil health*

The downward spiral of soil health is a flagship research and development issue for agricultural development in the Pacific. The traditional fallow or shifting cultivation in the Pacific Islands have changed considerably. However, the productivity and sustainability of many cropping systems is threatened by a decline in the fertility, structure and biological health of soils. In volcanic islands, soil fertility was traditionally maintained through long 'bush fallow' periods; on atolls, leaf-fall tended to sustain shallow but fertile soils in diverse agroforestry systems, or growers assembled large amounts of organic matter in heaps or pits for intensive horticulture. This practice was once described as cost-free effortless regeneration of productivity. Both systems have tended to break down with increasing population pressure and migration.

With increasing intensity of cultivation, many countries have also increased the rate of deforestation and the use of machinery, which accelerate the loss of organic carbon and the breakdown of soil structure. With shorter fallow periods, more deforestation and higher use of machinery, the loss of organic carbon increases, as well as amplifying the degradation of water-stable aggregates, and render the land more prone to soil erosion. These factors contributed to the most important flagship agricultural issue of our time in the Pacific region – the downward spiral of soil productivity. This issue boils down to loss of soil organic carbon, which is also found to be associated with a cascade of secondary problems like water availability, structural degradation and increasing pests and diseases (ACIAR PCV/2010/038).[3]

This activity will also link to the '4 per 1000' initiative and the FAO Global Soil Partnership recarbonization initiative. Both advocate that increasing soil organic carbon will absorb much of the carbon dioxide released by fossil fuel. It should be emphasised here that carbon sinks by means of soil and forest trees will be advocated. This is also the link for KJWA in the Pacific SIDS to nationally determined contributions (NDC) which at the moment are mostly energy-driven. Agriculture can provide the solution to significantly reduce GHGs emitted in the countries. KJWA activities should be aligned in NDCs, National Adaptation Programs (NAP) and Pacific SIDS Technology Needs Assessments (TNAs) and Technology Action Plans (TAP) processes.

### *iii. Correlation between climate change, pest, disease and transboundary/invasive species, and related impact of food security*

With more food production becoming monocrops, the incidences of pests and diseases are increasing. In livestock production, high priority should be given to address zoonotic diseases like African swine flu. Climate change further adds to this challenge and the need for more information, knowledge and actions are key priorities in the region.

[3] ACIAR PC/2010/038. *Identifying Pilot Sites and Research Methods for Soil Health Research in the Pacific*. Led by Dr. Mike Smith, QDAFF.

### *iv. Adaptation-mitigation co-benefits through reducing emissions of methane and nitrous oxide*

As part of this approach, countries will improve livestock and manure management to reduce methane production. Most nitrous oxide is released from nitrogenous fertilizer use. A high priority for the Pacific SIDS is to increase the value and use of soil tests to determine the amount of fertilizers to use and also look at alternatives to improve the nitrogen use efficiency, including leguminous crops. This activity is also a link to the national NDC plans.

### *v. Water management*

The Pacific SIDS has some of the most vulnerable countries to climate change and the incidences of drought are increasing in the region. A sustainable water management strategy for each country should be developed and look at developing water budgets from rainfall and evapotranspiration data. A high priority for the Pacific SIDS is to promote use of the bucket drip irrigation systems, protected cropping, as well as wicking-based systems.

### *vi. Improved biodiversity*

Resilience of food production systems hinges significantly on biodiversity. This is linked to the improved soil health output from below-ground biodiversity. It should be emphasized that above-ground biodiversity is dependent on healthy below-ground biodiversity. A sustainable food production system will also need to utilise the best adaptable varieties of crops, trees and animals. A priority for the Pacific SIDS is therefore to improve biodiversity in farming systems to improve soil health and increase sustainable food production.

### *vii. Use of long-term weather forecast*

The countries agreed that farming communities should be provided with tools for using long term weather data.

### *viii. Improved climate resilience value chain and marketing*

Key value chains will be selected to assess their vulnerabilities to climate change and to improve their vulnerabilities and their competitiveness in the local and export markets. The food chain should be designed to also reduce food waste. The compound impacts of climate change and the Covid -19 pandemic should be incorporated into the vulnerability analysis and the research and development of resilience of the island food production systems.

### *ix. Food Waste*

Globally about 30% of food production goes to waste. Food waste is not just a social issue – it is an environmental one as well. If food waste ended up in the landfills and rots, it will produce methane. About 8% of global greenhouse gas emissions comes from food waste (FAO, 2011[4]). There is very limited information on food waste in the PSIDS. In this activity, a life cycle assessment of waste in each country will be conducted and then a strategy developed to address the problems related to food waste in order to reduce GHG emissions.

### *x. Capacity building*

There is a significant capacity gap in the Pacific Ministries of Agriculture when it comes to understanding climate change impacts on the agriculture sectors. Capacity needs analysis in each country will determine relevant topics for capacity building support. Stakeholder needs assessment will be conducted at three levels: (i) organizational; (ii) individual; and (iii) team work – partnership

[4] FAO. 2011. Global food losses and food waste – Extent, causes and prevention. Rome

needs. A continuing high priority for the Pacific SIDS is to develop further sectorial and ministry capacities to improve and protect agricultural production into the future.

## C. Progress in implementation of KJWA in Pacific SIDS

In order to sustain the intensification of food production in the face of climate change, there is a need to develop and adopt technologies that will improve or sustain productivity, while enhancing natural capitals and ecosystem services. However, the proportion of national budgets allocated to agriculture development by Pacific Island countries is quite low ranging from less than 1 to 3%. To implement work linked to KJWA, countries are forging strategic partnerships nationally with key farming organisations, entrepreneurs, farmer field schools, training centres, regional organizations like SPC, SPREP, USP, Australian DFAT and NZAID, and international organizations like UN agencies (FAO and IFAD), EU, USAID, GIZ and ACIAR to promote research and development in the sector. The Pacific Soil Partnership (PSP) of the FAO Global Soil Partnership in its meeting in Brisbane in June 2019 pledged to support the KJWA in the countries. The activities carried under these partnerships include:

### *a) Use of Cover Crops like Mucuna pruriens and Dolichos lablab*

These cover crops are being used in countries like Tonga, Fiji, Samoa, Solomon Islands, Vanuatu, Cook Islands and Niue. These are being used as short term fallow to improve soil health and soil fertility and ultimately improve soil organic carbon (Anand, 2016[5]; Lal, 2013[6]). These activities are also linked the FAO GSP ITPS soil recarbonization initiatives as well as the French '4 per 1000' initiative. This work is a collaboration with EU, ACIAR, SPC and FAO, and over the years much of the activities have been phased over to countries.

### *b) Targeted Compost*

Atoll soils of Kiribati, Tuvalu and Marshall Islands are deficient in several nutrients like nitrogen (N), phosphorus (P), potassium (K), iron (Fe), copper (Cu) and manganese (Mn). Applying typical compost to improve the soil does not work all the time. Targeted composts can be made from compost recipes with ingredients that are high in these nutrients. Work on compost has been introduced to the countries several years back, but targeted compost was only developed in the last few years under combined support from ACIAR, FAO and SPC. This activity also contributes to improved use of animal manures and of plant nutrients.

### *c) Improved Nutrient Use*

EU, ACIAR, CSIRO and FAO have supported countries in building their capacity in improved nutrient use by introducing quick soil test kits for testing farmers' soils to guide fertilizer recommendations. Tonga, Fiji, Samoa, Tuvalu, Kiribati and Marshall Islands have been supplied with Palintest SKW 500 and Hanna HI 3895 test kits for chemical analyses, and Solvita carbon dioxide respiration test kits for biological activity tests measuring carbon dioxide respiration. This activity also looked at nutrient accounting in the selected farming systems in combination with water use efficiency. FullStops wetting front detectors and chameleon soil water sensors are being used to measure water use efficiency.

### *FAO KJWA Project*

FAO allocated USD 440,000 under its Technical Cooperation Project, "Supporting the Pacific to address the vulnerabilities of agriculture and food security to climate change through the Koronivia Joint Work on Agriculture"[7]. The first Regional Consultative Workshop was held in Nadi, Fiji, on 24−26 July 2019, where 11 countries participated, represented mainly by their respective Ministry of Agriculture and some officials from those government agencies responsible for climate change.

[5] Anand, S. 2016. Developing a taro (Colocasia esculenta) production system based on genotype and fallow system for economic and environmental sustainability under local conditions in Samoa. A thesis submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy to the University of the South Pacific, Samoa.

[6] Lal, R. 2013. Influence of Mucuna (Mucuna Pruriens) fallow crop on selected soil properties and taro yield in Taveuni Fiji. A thesis submitted in fulfillment of the requirements for a degree of Master of Agriculture to the University of the South Pacific, Samoa.

[7] (TCP/SAP/3706)

Outcomes from the Consultative Workshop include - but are not limited to - the following:

i. Establishment of a Regional Task Force representing officials from the interested countries, as well as some who attended the workshop. The Regional Task Force will ensure that future dialogue builds on the current momentum and that further research is carried out to develop a KJWA regional submission to the UNFCCC.

ii. Strengthening of KJWA support at the national and regional levels.

iii. Development of a draft regional roadmap by FAO and its partners, based on the TCP/SAP/3706, which builds on the KJWA Global Roadmap.

iv. Advocacy for and the advancement of the agriculture and climate change debate at regional meetings, as well as encouragement of Pacific Island Countries to actively engage at the international level.

v. Ensure collaboration between FAO and the Secretariat of the Pacific Community to advance work based on the KJWA.

***Adaptation to climate change***

Countries have been investing in adaptation measures to climate change for various sectors including food production and food security. The adaptation planning process in the Pacific Island Countries (PICs), mostly follows the experiences and tools used in disaster risk management processes, which are based on historic data and coping experiences of extreme events (Dumaru et al., 2017[8]; SPC-SPREP-GIZ, 2016[9]). Coping and adaptation strategies are informed by what has been implemented in PICs to reduce the impacts of such hazards in the past – combinations of traditional knowledge, modern agriculture practices such as the introduction of new varieties and the diversification of crops and farming methods. As such, these initiatives are generally considered to be "no/low regrets" solutions as they bring benefits irrespective of whether climate change impacts eventuate or not, or "incremental" solutions, whereby steps are taken to reduce current and, potentially, future climate risks, but current systems are maintained (Iese et al., 2018[10]).

Adaptation actions in the agriculture sector have been project-based, mostly implemented at community levels, and are funded through bilateral and multilateral arrangements. The SPREP-led Pacific Adaptation to Climate Change (PACC) project was probably the biggest project during about 2009 to 2015 with Fiji, Palau, PNG and Solomon Islands developing adaptation measures for food production and food security. UNDP also at about the same time supported countries in developing the national adaptation program of actions (NAPA) to improve countries' adaptive capacity to impacts of climate change on various aspects of the life of people of the Pacific including food production. From about 2012 to about 2015, USAID and SPC supported countries like Tonga, Samoa, Fiji, Solomon Islands and Kiribati in developing climate resilient food systems. GIZ has also been supporting development of climate resilient forestry and food production systems in the countries.

The limitations of agricultural adaptation planning processes and no/low regret adaptation options "has led to a growing discourse regarding transformational adaptation" (Klein et al., 2014[11]). Climate change has already contributed to an increasing frequency and/or intensity of many extreme events in the

[8] Dumaru, P., Martin, T., Lowry, B., Manuella, T., Koppert, T., Deiye, T., Pouvalu, S., Combe, H. J. Des, & Holland, E. (2017). *Framework Guide for Community Resilient Development: Pacific Islands Community Integrated Vulnerability Assessment (CIVA) A Tool for Resilience Management*.

[9] SPC-SPREP-GIZ. (2016). *Integrated vulnerability assessment framework for atoll islands: a collaborative approach*.

[10] Iese, V., Holland, E., Wairiu, M., Havea, R., Patolo, S., Nishi, M., Hoponoa, T., Bourke, R. M., Dean, A., & Waqainabete, L. (2018). Facing food security risks: The rise and rise of the sweet potato in the Pacific Islands. *Global Food Security*, *18*(August), 48–56. https://doi.org/10.1016/j.gfs.2018.07.004

[11] Klein, R. J. T., Midgley, G. F., Preston, B. L., Alam, M., Berkhout, F. G. H., Dow, K., Shaw, M. R., Gitay, H., Thurlow, J., Buob, S., & Thomas, A. (2014). Adaptation opportunities, constraints, and limits. In C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, M. Chatterjee, K. L. Ebi, Y. O. Estrada, R. C. Genova, B. Girma, E. S. Kissel, A. N. Levy, S. MacCracken, P. R. Mastrandrea, & L. L. White (Eds.), *Climate Change 2014 Impacts, Adaptation and Vulnerability: Part A: Global and Sectoral Aspects* (pp. 899–944). Cambridge University Press. https://doi.org/10.1017/CBO9781107415379.021

Pacific, and climate change impacts are only going to continue to escalate over the coming decades, regardless of which emissions scenario the world follows (Chand, 2020; Nunn et al., 2020). Bridging the gap between projections and decision-making requires information about climate change projections to be translated into potential impacts on the growth, development and yield of important crops (Iese et al., 2020[12]; Nunn et al., 2020[13]). Key actions needed are:

- Application of decision support tools to explore agriculture adaptation options or scenario-based adaptation options to inform decision making and implementation at communities and national levels. Availability of information on potential impacts of projected climate change on agriculture production, sustainability, income, food security/systems, culture and livelihoods of Pacific Islands households and communities are needed.
- Determine tolerance limits (including systemic risk tolerance) of biophysical agriculture systems (germplasm, soils, livestock) and understand limits (including biophysical, resources, capacity) of different agricultural adaptation options in PICs.
- Develop transformational adaptation pathways (based on adaptation-mitigation co-benefits) for PICs agriculture systems in a changing climate.
- Develop agriculture adaptation impact/adoption evaluation methodologies to document effectiveness of adaptation and loss and damage at household and national levels. Methods could also include how adaptation contribute to reducing vulnerabilities at the household level.
- Develop agriculture-climate-livelihood nexus collaboration to exchange expertise, resources and capacity in planning, implementation and evaluation of agricultural adaptations.
- Understand systemic risks of global pandemics, such as COVID-19 on agriculture-climate-livelihood nexus.
- Develop and implement financial mechanisms for implementing KJWA and support agriculture adaptation and mitigation activities in PICs.

**D. Way Forward**

The Pacific has had little engagement with the KJWA under the UNFCCC. FAO's KJWA project aims to support Pacific countries to address the vulnerabilities of agriculture and food security to climate change through the KJWA, which has enabled some engagement of Pacific Ministries of Agriculture in the process. The KJWA roadmap established a process until COP 26 and with regards to the way forward, the Pacific SIDS proposes:

- Call on all Parties to agree on a decision for the continuation of the KJWA process beyond COP26, building on current positive momentum;
- Organise regional workshops and include agriculture experts in the implementation of future activities, with supported participation of agriculture experts from SIDS and LDC;
- Urgent consideration of climate actions and financing in the agricultural sectors;
- Involving the community from day one is the recipe for success;
- Support the countries in developing tracking tools to measure impacts of climate change and adaptation and mitigation measures adopted by the countries.

[12] Iese, V., Halavatau, S., N'Yeurt, A., Wairiu, M., Holland, E., Dean, A., Veisa, F., Patolo, S., Havea, R., Bosenaqali, S., & Navunicagi, O. (2020). Agriculture Under a Changing Climate. In L. Kumar (Ed.), *Climate Change and Impacts in the Pacific* (pp. 323–358). Springer Climate. https://doi.org/10.1007/978-3-030-32878-8

[13] Nunn, P. D., McLean, R., Dean, A., Fong, T., Iese, V., Katonivualiku, M., Klöck, C., Korovulavula, I., Kumar, R., & Tabe, T. (2020). Adaptation to Climate Change: Contemporary Challenges and Perspectives. In L. Kumar (Ed.), *Climate Change and Impacts in the Pacific* (pp. 499–524). Springer Climate. https://doi.org/10.1007/978-3-030-32878-8_14