

Land Resources Division

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LRD Country and Territory Partners in the Pacific

Foreword

As 2021 slips away from the long shadow of 2020, the Land Resources Division continues to work with fore-thought, ambition and a dash of hope. SPC followed organizations, communities and people in the Pacific and worldwide in completing a crash course in the "new normal" in response to COVID-19 and the pandemic that swept into our small island states early in the year.

For LRD, the new normal of cancelled in-person trainings and meetings, narrowed project capacities, and longer lead times for launches, assessments, reviews and trainings provided fresh opportunities not only for remote working and learning, but also more intensive planning that I am confident will take us to new heights in 2021. COVID forced LRD to pause, but not stand still, and we worked out new ways throughout the year to ensure each pause was followed by another stride forward.

The LRD Genetic Resources team was one of first to turn pauses into positives. With in-person seed trainings cancelled, the team quickly moved to online consultations and held several during the year. The team also used the extra time online to install a new gene bank information system, as well as share a new monitoring protocol via zoom. And it did not slow down with its accessions, conserving a total 2,237 during the year, along with 17 crops.

As much of LRD's work went online, we focused on strengthening existing partnerships and initiating new ones. One major success was the development of an important coconut project in partnership with FAO that will be in full force in 2021.

The coconut project rooted a focus on women's engagement, building on strong efforts in 2019 to expand inclusiveness for women and underserved communities. These efforts picked up speed in 2020 even without in-person LRD engagement. The women's planting project in the Western Fiji village of Nadroumi saw success with 30 additional women purchasing seedlings for planting from the Nadroumi Women's group. In Fiji's Ba catchment, the Tokoni village women's group established a nursery for native trees, and in Korobua, LRD held a natural resource management training for women and youth. In Palau, investment in two value chains for taro and vegetables was focused on supporting women.

With many communities absorbing LRD's previous engagement to drive fieldwork themselves throughout the year, we took the opportunity to fast-track projects at home that will benefit the whole region, for example opening the New Plant Health Lab, a first of its kind facility in the Pacific that will have a Biosecurity Containment Level that will allow it to develop controls for emerging pests and diseases. Once opened, the Plant Health Team quickly got online to hold several trainings and diagnoses.

Finally, though the new normal will not be permanent, LRD grasped that changes in the region due to COVID will require a robust response and new ways of working for many years to come. One COVID aftereffect was an increase in food insecurity. LRD responded by partnering with the European Union on the Pacific Regional Integrated Food and Nutrition Security Initiative to COVID-19 (PRISCO19), a drive that will build and strengthen sustainable and resilient food systems in the region, focusing on good governance so that they can withstand future shocks. LRD continues to pass its other programming through this all-important COVID lens, ensuring the unique and pressing challenges this disruption has created are addressed.

At LRD we look forward to a 2021 brimming with more challenges, opportunities, and learning. The COVID-19 crisis has both reinforced our resilience and opened a garden of opportunity and goodwill. We invite you to join us as we tend that garden to help the Pacific blossom in this new dawn.

Karen Mapusua

Director - Land Resources Division

Pacific Community

The Land Resources Division partners with Pacific peoples to realize a series of objectives that are ambitious, discerning, and responsive for communities in the region. The following is an overview of advances and successes in our five main objectives in 2020.

Objectives

Objective 1: Land, agriculture, forestry and genetic resources are sustainably managed and conserved

While COVID-19 had an impact on LRD's genetic resources work in 2020, the genetic resources team was able to make progress in a number of areas. Accession distribution continued with seed collection and storage. Though the pandemic in the Pacific would not allow the typical in-person trainings on seeds, the LRD Genetic Resources Pillar team adapted by holding several online consultations. LRD also adapted to the new online reality due to COVID by increasing its provision of remote technical advice and support to farmers. Everyday work disruptions also gave LRD the opportunity to shore-up its protocols and systems, including, for example, installation of a new gene bank information system and drafting a monitoring protocol that was shared with partners via Zoom calls. With the LRD team grounded for the majority of the year, remote participation in workshops and trainings on topics such as organic agriculture and soil fertility increased. Research work on vital crops such as coconut also continued, and the LRD team still managed to support on-the-ground and in-person training in areas such as coconut zygotic embryo extraction and culture. The LRD team also continued its work on land use and conservation in water catchments, connecting to over 20 communities in Fiji to identify project sites and establish agroforestry demonstration plots.

Research and Technical Support

While on the ground technical support became a challenge during the year, LRD continued to provide ongoing remote technical advice and support to farmers as requested. Organic farming practices were promoted weekly through POETCom's website and social media platforms. POETCom contributed remotely to two workshops – one on soil fertility and plant nutrition and the second on introduction to organic farming – held in Palau with in-country partners. The soil fertility workshop was attended by 22 participants (11 females, 6 males, 5 unreported sex) and the organic farming workshop was attended by 19 participants (14 females, 4 males and 1 unreported sex).

The COVID pause during the year provided an opportunity to the LRD team to carry out needed research, in addition to establishing protocols and reviewing and improving monitoring, stock taking and indexing. Research work was completed during the year with the aim to establish cleaning protocols for in-vitro bacteria contamination in cultures, especially in taro. Additional protocol optimization research during the year took place for the Colocasia bobone disease-associated virus.

Other important activities for maintaining and strengthening LRD's crops and trees collection included initiating the acquisition of cryopreservation equipment for the new CePaCT cryo-lab, conducting a review for inclusion of tree species into the CePaCT crops database, and initiation of field trials on grafted breadfruit to identify low tree forms.

The LRD team during the year also reviewed equipment lists to improve monitoring and stock taking in line with QMS (quality monitoring system) ex-

pectations. The devastating Beirut city explosion during the year spurred additional research on replacing ammonium nitrate in the culture medium. LRD Laboratory records and procedures were updated during the year, in particular for coconut research. Standard operating procedures for cryopreservation are being drafted and a protocol for cleaning bacteria from in-vitro coconut cultures is being developed.

To help clear the backlog of virus indexing at Ce-PaCT, 432 leaf samples from selected taro accessions were shipped to the New Zealand Ministry of Water and Land Resources during 2020. A second lot of 2,230 taro accessions for virus indexing was transplanted in the post entry quarantine. Preliminary bacterial elimination trials were carried out to clean accessions contaminated with bacteria using antibiotics.

LRD completed consultations with the Cook Islands during the year on signing a standard material transfer agreement (SMTA) for their materials. This is expected to be signed in Quarter 1, 2021. Consultations on an SMTA with Vanuatu will take place in early 2021, with an agreement to be signed shortly thereafter.

Accessions

Despite the COVID-19 shutdown, LRD did not slow down when it came to collecting and distributing crop varieties in 2020. By the end of the year, a total of 2,237 accessions of 17 crops had been conserved at CePaCT. In the first quarter of the year, 14 accessions of taro, yam, banana, sweet potato and giant taro were identified by Wallis and Futuna for inclusion in CePaCT collections.



Public-private partnerships work toward sustainable seed systems in Tonga

Food and nutrition security remains an important development objective of Pacific Island Countries and Territories. Access to, and availability of, quality, hardy and nutritious food crops is critical to reaching this objective in the region. This must be facilitated through strategic partnerships to create sustainable and robust seed systems at every level.

LRD genetic resources and sustainable agriculture programmes have long supported countries in the conservation, utilisation and accession of food crops in the region. The Pacific's regional Genebank, the Centre for Pacific Crops and Trees (Ce-PaCT) is facilitating the conservation and distribution of crop diversity for food and nutrition security and enhanced livelihoods.

In 2018, CePaCT distributed over 200 tissue culture plants of sweet potato, banana, breadfruit, and pineapple to MORDI TT (Mainstreaming of Rural Development Initiatives Tonga Trust) for characterisation, field evaluation and selection of best varieties that are adaptable and high yielding, with good eating quality for local communities. LRD supported the transplanting of tissue culture plants to soil and their acclimatisation in the MORDITT screen houses.

Sweet potato was the initial target of MORDI TT's evaluation trial as it is generally fast maturing, easy to cultivate and nutritious. After evaluations, five varieties were chosen and multiplied on MORDI's plots, with the aim to distribute them to selected farmers to set up field plots.

The field plots provide a key opportunity to determine community engagement and share successes and lessons learned in regard to planting materials

MORDITT successfully engaged big growers such as Mr Taufa 'Ahome'e and Mr Manase Siua under a new initiative called the Seedling Bank that aims to support local smallholder farmers in accessing planting materials, in addition to wider distribution of selected varieties to local communities. Engaging big farmers to multiply climate resilient varieties helped provide yield for their consumption and for sale in the local market, while the suckers, cuttings or vines brought back to MORDI TT were distributed to smallholder farmers, where the materials will be further multiplied and shared with communities throughout Tonga. These partnerships helped MORDI TT to meet national demand for planting materials following the impacts of Tropical Cyclone Harold in April 2020.

MORDITT's Chief Executive Officer, Mr Soane Patolo, stated, "Transformation of rural farming needs to be resilient, and in order to do that we must have drought resistant and resilient crops. With the help of SPC, we were able to receive several samples to propagate in the nursery that eventually were raised successfully and harvested for community distribution. After COVID-19, households are now better prepared, food security wise. We look forward to continued partnership with SPC for increased livelihood support, not just for our local farmers, but for our people".

In quarter two (April through June) when the pandemic was spreading throughout the region, 59 new accessions, 46 of taro, 7 of xanthosma and 6 of sweet potato, from the Cook Islands, Vanuatu, Fiji and French Polynesia were registered in the CePaCT collections.

In quarter three (July through September) when COVID measures throughout the Pacific were still at their height, new accessions of banana (1), sweet potato (2) and cassava (1) from the Cook Islands and Vanuatu were registered into the collections. These accessions were collected and imported in previous years and planted in CePaCT collections. In addition, new accessions of taro, banana and sweet potato from Cook Islands and Vanuatu were registered.

In Fiji, there was a specific focus on coconut diversity during this period. LRD collaborated with the University of Queensland, Australia on 9 coconut accessions that were collected from Taveuni island, Fiji for research purposes on optimization of conservation and mass propagation protocols. In addition, 7 accessions from the same cultivars that were collected earlier were identified for a second collecting mission from Taveuni Coconut Field Genebank Fiji. These accessions will also be used for research purposes.

These accession successes unfortunately came with several losses during the year. Two accessions of banana, 6 of taro and 1 of potato were recorded lost during the year due to in-vitro contamination. The lost accessions originated from New Caledonia (2), PNG (2), Samoa (4) and Peru (1). However, CePaCT is working to ensure they will be back in their collection by reaching out to reimport them from original sources and suppliers. CePaCT also identified additional lines during the year to add to their collections, including 18 taro lines from the Cook Islands and 1 yam hybrid variety from Vanuatu. In addition, 14 accessions of taro, yam, banana, sweet potato and giant taro were identified in Wallis and Futuna for inclusion into CePaCT collections. These lines will be gathered when COVID-related flights and SPC staff movement restrictions are lifted.

Despite travel and on-ground challenges during the year in order to identify new plants and crops, 5 kumala, 2 cassava and 4 taro varieties were characterized and are being finalised along with DNA samplings for a DNA analysis to determine varieties selected for growing suitability on atolls.

Seed conservation and distribution

COVID-19 made seed distribution difficult during the year, but the LRD team still managed to collect, store and conserve the region's vital tree species seeds. Seeds and herbarium vouchers of eight native species were collected. Bound for LRD partner KEW Gardens, the seeds were not able to travel due to the cancellation of international flights out of Fiji and were instead safely inventoried at CePaCT.

An additional set of sandalwood seeds were collected and stored at CePaCT for exchange with Tonga. CePaCT initiated procurement of seed collection and laboratory equipment and consumables to store the seeds.

Pacific Seeds for Life (PS4L) held online consultations with Vanuatu, Samoa, Kiribati and Tuvalu on priority seed systems during the year. The four countries developed work plans for the systems and identified priorities that include tissue culture, open pollinated seed evaluation and screening, roots and tubers, coconut seed systems, in-country seed testing units and processing, community-based seed banks and seed systems guidelines and capacity building. In Tonga and Vanuatu technical and funding support for two national seed centres was initiated.

Progress was also realized on seed development during the year. Consultations with Tonga, Fiji, Vanuatu, Kiribati, Samoa and Tuvalu helped identify key project partners on seed development activities, as well as capacity building needs and the development of training packages that are expected to be finalised in 2021. A Seed Systems Specialist was recruited, and once on board, will produce a set of seed production guidelines in 2021.

Trainings, demonstrations and capacity building

Despite difficulties in travelling and meeting communities face-to-face during the year, LRD staff still managed to complete a number of trainings and demonstrations in an effort to shore up momentum in the division's capacity building efforts. Youth and women from Korobua, Fiji were trained in natural resource management during the year. The LRD team also completed a training on coconut zygotic embryo extraction and culture in November, guiding 13 staff of the Taveuni Research Development Centre in Fiji through hands-on skills in isolation and sterilisation procedures.

On Fiji's West Coast in the village of Nadroumi, 30 women purchased seedlings for planting from the Nadroumi Women's group, a project that is part of LRD's work in REDD+. A number of other forest related projects also got underway during the year. In the Ba catchment in Fiji, the Tokoni village women's group established a small nursery for native trees. Thirty women, of which 20 percent were youth, participated. Agroforestry demonstration plots were established in the Waidina, Ba, Labasa and Tunuloa catchments. In the Labasa catchment, LRD teams collaborated to bring sustainable land management (SLM) awareness training to nine villages. SLM training was also completed in the Waidina and Ba catchments.

The LRD team carried out Participatory Land Use Planning (PLUP) training in Fiji's Ba Catchment during the year. PLUP was additionally conducted in the Labasa catchment. In Tikina Navatusila, Tokoni and Mare villages in Fiji, a nursery training for 24 people included 40 percent women.

Country consultations during the year led to identification of priority capacity building needs. LRD, for example, agreed to work with Land Care to engage specialists to develop seed production, including training packages.

Policy and Programme Development

Though field and face-to-face activities slowed during the year, LRD continued to move forward on major programmes and policies through project sign-offs and contracts, work plans and workshops. LRD came to agreement with its partner FAO on a major coconut project that will begin implementation in 2021. The project has a strong focus on women's engagement.

In Fiji, a Forestry Draft Monitoring Protocol was introduced in three main government divisions (Central, Western and Northern) for consultation purposes and discussions with a consultant, done through Zoom meetings. Included in the consultations was a discussion on the review of the Fiji Code of Harvesting practices. As part of this, LRD also contributed to the development of the Fiji Sawmilling code ethics report. A related awareness session on fire management strategy was additionally held in the Waidina catchment communities.

In Tuvalu, LRD worked with a consultant to develop a climate change and food security analysis for the country. A design for Tuvalu's Food Futures Programme has been developed and submitted for funding consideration. LRD also engaged partners in Tuvalu for promotion of food cube technology to support new crop varieties. The varieties are set to be evaluated in 2021. Design for a Food Futures phase 2 that will be implemented in Kiribati and Fiji was also finished during the year.

In Palau, the Palau Organic Growers Association (POGA) delivered several milestones per their agreement with POETCom (Pacific Organic and Ethical Trade Community). POGA held two workshops with remote support from POETCom.

CePaCT continued its crop characterization for selected Pacific atoll nations during the year. The DNA analysis for the crops has been delayed to 2021 due to delays in the shipment of comparative samples from CePaCT to New Zealand as a result of COVID-19 disruptions to shipping schedules. Once the crop characterisation is completed, an information brief on the varieties selected for atolls will be developed and promoted to the countries.

CePaCT also made progress during the year on a number of different fronts in regard to infrastructure, policy and collaborative efforts. Though development of a Genebank policy had to be delayed until 2021, planning for it was set during the year. CePaCT also developed two Standard Operating Procedures (SOPs) during the year, with plans to develop another three in 2021. Construction on a new greenhouse for plants under post-entry quarantine began during the year, and draft plans for a cryopreservation facility

were drawn up. Fittings for the CePaCT molecular lab also began during the year through ordering of needed equipment.

CePaCT also took steps to further streamline conservation activity through an Android app for inventory maintenance. A collaboration with a consultant for app development is ongoing. A soft deployment of the app will take place in 2021 using a small collection of accessions. Staff will be trained on the app prior to the initial deployment.

An additional milestone reached by CePaCT during the year was the installation of the Grin Global Genebank Information System. CePaCT is now working on the System's compatibility with CePaCT documentation systems. Though discussions with Grin Global Australia have been put on hold due to COVID challenges in Australia, system testing, and training continues. This new system will include a website that users can easily access for information on crops that are available from the CePaCT Genebank.

Focus on women and youth

LRD continued with its focus on integrating women and youth into every aspect of its work during 2020 to ensure that these traditionally underserved communities are brought into the conversation and have equal access to agriculture, forestry and related livelihood opportunities. LRD has also begun to write these communities into programme and project design from the start so that their acceptance and impact is practiced from day one. The new coconut programme agreed upon in 2020, for example, has a strong focus on women's engagement written into it.

In the Fiji village of Korobua, a natural resource management training was held for 11 youth and women. The Nadroumi Women's Group also continued to cultivate success during the year, selling their seedlings to 30 women that will use them for farming and agroforestry projects. In Fiji's Ba catchment, the Tokoni village women's group established a small nursery for native trees with LRD support. The Tokoni group comprises 30 women, of which 20 percent are youth. The nursery project also included establishment of a geoforestry demonstration farm. Women were also included in reforestation activities in the Waidina catchment, comprising 8 of the 22 (37%) participants.

Women were highly represented in other trainings during the year as well. At a participatory land use planning training in Ba catchment, 40 percent of attendees were women. A nursery training that included Tikina Navatusila, Tokoni, Mare and Nanoko villages also had 40 percent women attendance.

The POETCom programme also stepped up its inclusiveness during 2020. Two workshops held during the year had majority female participation: an organic farming workshop was attended by 14 females, 4 males and 1 unreported sex while a soil fertility and plant nutrition workshop included 11 females, 6 males and 5 unreported sex.



Enhancing Fiji's food and nutrition security through increased crop diversity

The Pacific's regional Genebank, the Centre for Pacific Crops and Trees (CePaCT) has the key mandate of supporting the region in the effective conservation and efficient use of plant genetic resources for food and agriculture. CePaCT is uniquely placed to respond to country food and nutrition security needs, specifically on the long term conservation of important food crops. It facilitates access to the availability of these crops, including varieties sourced from outside of the region.

The Centre had over 2,200 accessions of 18 crops as of December 2020 and has distributed over 85,000 tissue culture plants of 15 crops to over 50 countries in the past 15 years. Member countries support CePaCT's impact on the ground mainly through Ministries of Agriculture.

CePaCT has been working very closely with the Fiji Ministry of Agriculture (MOA) to identify, collect, and conserve Fiji's important food crops and increase the resilience and sustainability of the country's agricultural crop base. CePaCT has been distributing new and improved crops from within and outside of the region to MOA, where the crops are evaluated. Adaptable varieties are distributed to Fijian farmers and farming communities.

In 2018, MOA launched three crop varieties, including one sweet potato variety (Golden brown) and two varieties of taro (Tarova Loa and Tarova Vula). CePaCT supplied the varieties for evaluation and breeding purposes.

Following the launch of the three varieties, SPC followed up with MOA colleagues on their impact. Savenaca Cuquma, a Senior Research Officer with the Ministry, affirmed that farmers liked the new varieties. Many farmers commended the sweet potato's great taste, likening it to sugar, while others said that "if you eat it today, you will want to eat it every day". By October 2020, a total of 46,000 Golden Brown sweet potato vines' and 10,000 suckers of both taro varieties were distributed to more than 800 farmers on Fiji's largest island, Viti Levu, with additional planting materials being prepared to be shared with farmers on the other main island, Vanua Levu.

In addition to these varieties, further work carried out by the Ministry includes evaluation of new open pollinated sweet potato lines derived from varieties sourced from CePaCT. Taro breeding and evaluation crossing SPC CePaCT-sourced taro leaf blight-resistant varieties with local taro continues. The ultimate aim is to create a wider diversity of nutritious and resilient varieties for local farmers.

An additional impact of these collaborations between LRD and the Fiji government is knowledge and capacity development, as evident through Mr. Cuquma's work on steering roots and tuber cropresearch within MOA. Mr. Cuquma has stated that his knowledge and understanding of crop breeding for taro, sweet potato, cassava, and yam was built-up due to guidance from regional experts and SPC-led regional trainings and workshops. Mr. Cuquma is keen to continue his work on roots and tuber crops and at the same time share his knowledge and experience with his colleagues to promote sustainability.

Objective 2: Enhanced ability to meet local and international market requirements for agriculture and forestry products

Local and international markets suffered significant hardships in 2020 after COVID-19 swept through the Pacific. With many markets partially or completely closed, LRD worked on planning and building project infrastructure so that its partners and communities would have a solid foundation from which to launch once the markets fully re-open.

Trainings and capacity development

During the year work began on the development of the Gender and Value Chain Assessment module by the POETCom team. Related work on a gender and value chain assessment toolkit is also being developed. This module is expected to be finished in 2021. Work on a financial training module was also initiated during the year.

Revisions and updating for the Participatory Guarantee System (PGS) and the Pacific Organic Standard (POS) also got underway in the last half of 2020. Though this work was delayed due to COVID, it is expected to get back on track full-time in 2021.

The Coconut Rhinoceros Beetle (CRB) training manual was finalised and published to guide regional efforts in combatting this destructive pest. The CRB database design was finalised and database is now operational, with ongoing data entry from the Solomon Islands and Fiji using the Kobo Toolbox.

Technical support was provided to Vanuatu on the implementation of CRB surveillance, containment and control as part of the SPC Tropical Cyclone Harold response package. Procurement and distribution of CRB traps and lures went to Vanuatu (500) and Wallis and Futuna (100 trap and 200 lure shipment). In addition, ongoing support was provided to the Solomon Islands CRB cleanup campaign through technical support and community engagement. An additional 1,500 CRB lures and 1,000 Fall Armyworm lures were received from Costa Rica and were distributed to PNG, the Solomon Islands and Vanuatu in 2020. Additional technical support on CRB awareness was provided to New Caledonia, with completed materials such as posters and brochures in French ready for distribution. In addition, a new microscope was procured from New Zealand to support Metarhizium mass production activity in the pathology lab.

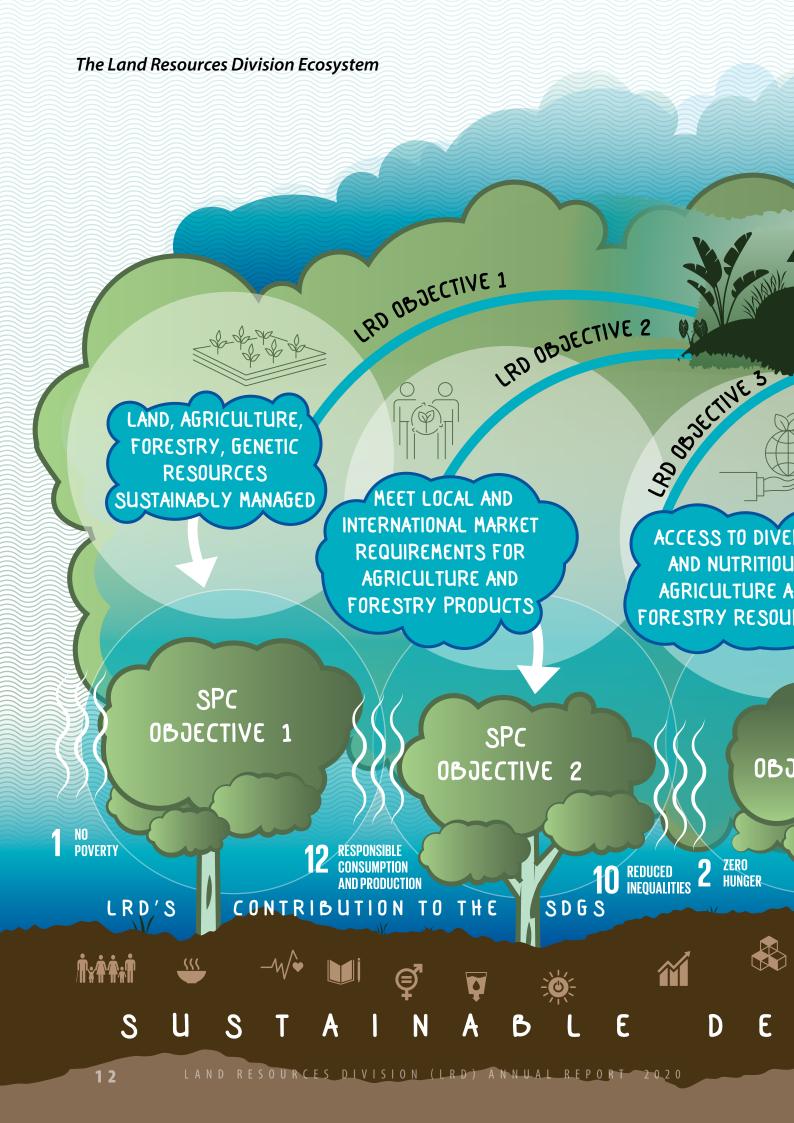
A Kobo toolbox refresher training was conducted for the Fiji Ministry of Agriculture Plant Protection team, and a revised recording template to ease surveillance and monitoring of CRB population was field tested. Kobo toolbox technology was instrumental in obtaining data from the Sol Island CRB clean-up campaign two years after the inception of the project.

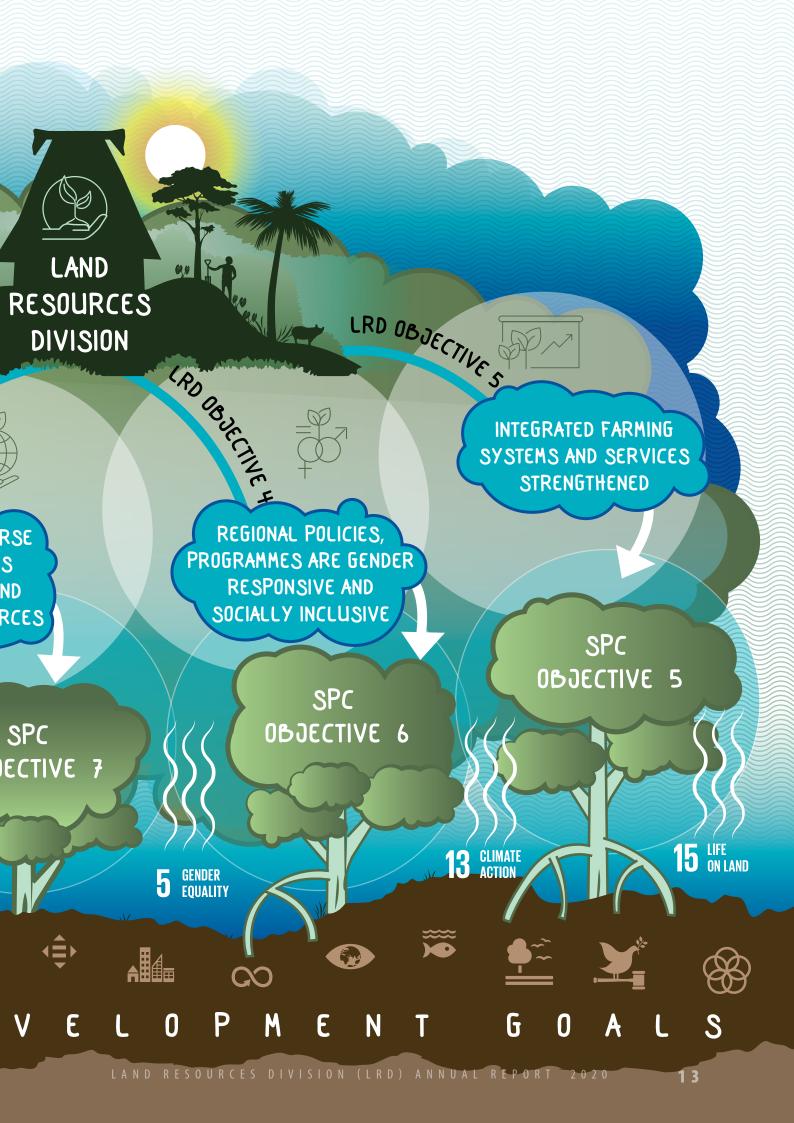
Collaboration and investment

During 2020, the POETCom initiative opened discussions with the National Project Coordinating Committees in Palau and the Republic of the Marshall Islands to call for expressions of interest for organic businesses that wanted to join the Building Prosperity for Women Producers, Processors and Women Owned Businesses through Organic Value Chains (BPWP) project.

The aftermath of the initial COVID-19 surge has produced an urgent need for Pacific countries to be more self-sufficient in food production. During the year LRD signed the Pacific Regional Integrated Food and Nutrition Security Initiative to COVID-19 (PRISCO19) initiative, a drive funded by the European Union and implemented by LRD. The one-year project is expected to be fully launched in 2021 and will deliver two outcomes: strengthening capacity of biosecurity services and upgrading sustainable food production and value addition as a response to COVID-19.

With travel restrictions in place for much of the year, the Plant Health Team focused on fast tracking the completion of the Plant Health Lab through acquisition and instalment of necessary equipment that is now supporting basic diagnostic work. In addition, the Plant Health team have successfully acquired a plant derived pesticide formulation (Neem oil, white oil) to support the Integrated Pest Management trials.





Objective 3: PICTs have access to diverse and nutritious agricultural and forestry resources resilient to the impacts of disasters and climate change

The COVID-19 emergency made distributing agricultural and forestry resources difficult in 2020. However, the LRD team was successful in both sourcing and distributing sweet potato, banana, cassava, taro and other seeds in a number of outreach efforts during the year. The team also provided knowledge and guidance on sampling and planting of trial plots. Planning and trainings continued despite complications in organizing them due to COVID measures, with sustainable land management trainings completed in 15 communities in Fiji. Workshops held during the year targeted government representatives, and the LRD team continued its mentoring and training for these officials and others. With many key meetings and partnerships forced to be put on hold during the year, LRD still managed to initiate other new partnerships and secure funding for vital post COVID meetings and projects in 2021.

Crop procurement, distribution, and promotion

CePaCT collections provided a number of crops to countries and universities in need in 2020. A total of 94 accessions (2,301 plant samples) of banana, breadfruit, cassava, giant swamp taro, sweet potato and taro sourced from CePaCT collections were distributed to Fiji, Marshall Islands, Solomon Islands, Tuvalu and the University of Queensland in Australia. The Fiji and Tuvalu distributions were carried out in quarter two of the year mainly in response to tropical cyclone Harold and COVID-19 requests. In addition to the CePaCT materials, a total of 357 kg of seeds were also secured both from local suppliers and from New Zealand in response to Fiji's emergency request.

Feedback from Fiji and MORDI (Mainstreaming of Rural Development Innovation) Tonga on the Ce-PaCT crop distribution was shared with farmers. For Fiji, 45,000 golden brown sweet potato crops were distributed by the Fiji Ministry of Agriculture to approximately 800 farmers. MORDI included sweet potatoes in the King's estate blocks and established demonstration plots in Vava'u and 'Eua.

Capacity development

Despite difficulties in one-to-one contact during the COVID emergency, LRD and its partners were able to complete a number of trainings and other capacity development activities during the year. Advances in LRD's cocoa work were particularly significant. In Fiji, a cocoa sampling and planting (trial plot establishment) took place in Tutu on the island of Taveuni in March. Additionally, a consultant was hired to carry out cocoa sampling activities in Fiji's Malampa province.

In the Solomon Islands, the Ministry of Agriculture and Livestock carried out cocoa sampling activities in their Eastern Province. Cocoa sampling was also done in Vanuatu. Additional cocoa work includes LRD assisting with cocoa fermentation in Samoa. Tropical Cyclone Harold rehabilitation work continued at VARTC (Vanuatu Agriculture Research and Technical Centre) with 364 grafted cocoa clones and soil sampling conducted in the fertilizer trial.

LRD was also able to conduct a number of trainings related to crop procurement and promotion in 2020. LRD led a training on Climate Smart App methodology for Fiji Ministry of Agriculture staff and the University of the South Pacific during the year. Government officials were also key participants in organic policy workshops held in Fiji (11 officials) and Vanuatu (10 officials). Mentoring and coaching for the officials for ongoing policy work in this area continued throughout 2020 and will continue in 2021.

LRD was also successful in carrying out sustainable land management training during the year, reaching out to 15 communities in Fiji.

For better uptake and impact, LRD completed translation of new soil technologies factsheets into the Kiribati and Tuvalu languages and distributed them in both countries for promotion.

Collaboration and investment

LRD established a key partnership with the Australian Grains Genebank in 2020 so that it can provide support on the implementation of CePaCT's Genebank Information System using the GrinGlobal database. Forward progress on the partnership was halted during the year due to COVID challenges, but work is expected to resume in 2021. Additional Genebank partnerships discussed during the year include collaboration with Samoa and Vanuatu, both of which will be further explored in 2021.

Though the PAPGREN (Pacific Agricultural Plant Genetic Resources Network) meeting scheduled for 2020 had to be postponed to 2021, the French Polynesia PAPGREN focal point secured a portion of the funding needed to hold an in-person meeting when conditions permit. LRD, under Pacific Seeds for Life, and the Australian Department of Foreign Affairs and Trade (DFAT), will complement the already pledged funding.

Objective 4: Regional and national policies, programmes and services in agriculture and forestry are gender responsive, socially inclusive, and promote and protect cultural heritage and human rights.

Though progress during the year was difficult due to the COVID emergency, LRD continued to set the stage in 2020 for strong steps forward on gender, social inclusion and cultural heritage and human rights. LRD kept busy with reviews, assessments and identification of areas and projects for support that will be developed for action in 2021.

Gender investment and support

In Palau, two value chains for taro and vegetables were identified for investments that will support women. The investment, including procurement of equipment, was delayed but is scheduled for early 2021. A rapid gender assessment was also completed for taro and vegetable value chains in Palau. In the Republic of Marshall Islands, a gender assessment on the Pandanus value chain was completed, along with a brochure on pandanus cultivation. Another preliminary value chain assessment, for coconut syrup, was completed for Rabi Island in Fiji.

During the year POETCom also began a gaps and opportunities assessment for Gender and Social Inclusion (GESI) in the Pacific Organic Standard and Participatory Guarantee System toolkit. The findings will inform the development of the gender and organic value chain assessment training module for a "training of trainers" scheduled for 2021.

POETCom also took steps to include GESI in its 5-year Strategic Plan (2020 – 2025) that took shape during the year and was scheduled to be released in early 2021. POETCom additionally adopted new guidelines on use of chemically treated municipal water for organic crop production. POETCom further promoted gender through its newsletter by including a women's section.

Social Inclusion and Protecting Cultural Heritage

LRD set the stage during the year for a number of policies that protect cultural heritage and ensure agriculture communities are included in efforts to build a more food secure future.

Consultations with Crop Trust and FAO led to steps to complete the CePaCT Genebank policy. A consultant will be engaged in 2021 to do further research and draft the policy. Steps were also taken to finalize the Pacific Agriculture Plant Genetic Resources (PAPGREN) Charter and PACIFIC Seed Systems Roadmap through a virtual meeting that was due to be held in early 2021. Delays on finalizing these documents were due mainly to action on response plans for COVID-19 and Tropical Cyclone Harold.

LRD continued its work online during these emergencies and initiated a consultation on the Vanuatu National Seed Policy Framework, in addition to activating a Vanuatu national seed policy working group to finalise the Framework. A follow up consultation with Vanuatu has been held and the final draft is scheduled to be submitted for publication in 2021. In Nauru, LRD worked with the national government to develop a Climate Smart Agriculture plan that will transform its agricultural sector to include all island communities and better respond to the needs of its people.

During the year LRD also collaborated with the European Union to draft a programme work plan for an Animal Health and Production (AHP) policy. Results of a priority needs assessment were synthesised into a regional priority framework to support re-engagement of countries in AHP activities, and to support resource mobilisation. The regional AHP Framework is due to be finalised in 2021.

Across all of the 2020 objectives the LRD team built the participation of women, youth and underserved communities into its activities. Numbers of women, youth and underserved communities trained are shown in the overviews of the other objectives in this report. See also the *Focus on women and youth* section under Objective 1.

Objective 5: Integrated farming systems and services strengthened

When COVID forced the LRD team to abandon many of its field assessments and trainings for the year, it sought to continue this vital work through online support and remote learning. LRD in many cases was able to switch its support to agriculture-based labs in the region to an online model, and also took steps to engage a number of in-country consultants to conduct a number of vulnerability assessments. LRD also kept alive its collaboration with partners in order to move forward on an Animal Health and Production framework for the region. Publications also continued during the year, with a training manual for addressing the Coconut Rhinoceros Beetle, a progress report on the PHAMA Plus programme and a plant health clinic manual, amongst others.

Knowledge investment and management

LRD continued to support in-country tissue and culture labs during the year. Support for labs in Fiji and Samoa was identified and mapped out under Pacific Seeds for Life. The work plans for this support are due to roll out in quarter 1 of 2021. Support for Wallis and Futuna labs scheduled for March 2020 was postponed due to COVID, though LRD was able to provide support for the country genebank remotely.

Though support for the Department of Agriculture and Rural Development Vanuatu new tissue culture lab was also postponed due to COVID, a review of the lab design and equipment list is now in progress.

LRD continued its assessments related to farming systems during the year, working with a consultant to conduct a vulnerability assessment for Tuvalu. The assessment will be used to determine programme design to support food and nutrition security for Tuvalu under the Food Futures programme. Tuvalu, along with Kiribati, will receive LRD support for climate smart agriculture production through a new grant agreement that was finalised in Quarter 4 of 2020.

LRD also worked in partnership with the SPC Climate Change Programme through the NDC Hub to develop for Nauru a climate change vulnerability assessment framework, a vulnerability assessment of Nauru's farming systems, and a climate smart agriculture plan that will deliver climate smart agriculture training. The Nauru CSA (Climate Smart Agriculture) Plan will be developed and published in 2021.

LRD stepped up its awareness campaign on African Swine Fever (ASF) during the year. It engaged a veterinarian to help promote the implications of ASF and held several online consultations with the Pacific Horticultural and Agricultural Market Access programme and the target countries of Vanuatu, Fiji and Papua New Guinea to identify target audiences and awareness materials. An ASF animated video was developed, along with posters, and was finalized to distribute to target countries in 2021.

LRD also supported an economic analysis in Fiji for growing capsicum and tomato during off season under a protected cropping system. The results

provided an important decision tool for governments and farmers alike and resulted in the Fiji Ministry of Agriculture and selected farmers in the Sigatoka and Tavua regions adopting the protected cropping structure. UNDP has also expressed interest to establish further demonstrations of the protected structure around Fiji. Drafting of a new manual on protected cropping began during the year and will be finalised in 2021.

Technical support, training and documentation

LRD made progress on a region-wide Animal Health and Production(AHP) framework in 2020. It completed an online survey and collated and analysed responses to help guide and develop the framework. The African Swine Fever (ASF) awareness campaign, as described above, contributed to the framework as consultation with countries on ASF and other priority animal health issues continued throughout the year.

Discussions with Australian project partners CSIRO (Commonwealth Scientific and Industrial Research Organisation) and ACIAR (Australian Centre for International Agriculture Research) resulted in LRD engaging USP-SAFT (University of the South Pacific School of Agriculture and Food Technology) to develop soil lab analysis protocols to guide soil analysis manual development and support ongoing capacity building on soil health. A contract with USP-SAFT was finalised to spur the development of soil test protocols that will support country capacity building on soil management. Additionally, soil management training support in Tonga began, in partnership with CSIRO.

In Tuvalu during the year, 75 food cubes were distributed and established on Funafala island. Project management and food cube management guidelines are being developed to support and mobilise communities in adopting this technology. Food cube technology was also distributed to Tuvalu and Kiribati for evaluation and promotion. In addition to Tuvalu, the wicking based system and food cubes were promoted in Kiribati. LRD worked in partnership with University of Tasmania and University of Adelaide on the submission of a scientific article on Atoll minerals that was published in the Multidisciplinary Digital Publishing Institute (MDPI) journal.

LRD supported the development of a draft for a Protected Cropping Field Manual that will be finalised in 2021. The manual is an important tool to support scaling of the protected cropping system that governments and farmers can adopt. It is expected to be completed in Quarter 4 of 2021.

In Sigatoka, Fiji, the LRD team continued to provide ongoing training support to farmers using the protected cropping system, and also assisted with the renovation of protected cropping systems post Tropical Cyclone Harold.

The LRD Plant Health Team, in partnership with country plant doctors, continued to collate and analyse plant health clinic data and WhatsApp plant data in 2020. Plant Health Clinic results are being compiled to support mapping of pests and disease trends and distribution in selected localities and countries.

In Fiji, resistance monitoring for farmers without using pesticides continued in relation to the Diamond Black Moth. A protocol on bioassay for Moth insecticide resistance was developed so that countries have a reference to establish resistance trials.

In Tonga, the Plant Health team received the Tonga Waite strain bioassay results and is currently waiting for field population results to conduct a resistance analysis. The Plant Health Team also completed ant exclusion trials, with data currently being analysed to determine natural enemies and control measures.

Consultations with LRD partners on addressing the Coconut Rhinoceros Beetle (CRB) continued during the year. The consultations resulted in identification and collation of activity plans for the target Melanesian countries. A Terms of Reference for the PARC Steering Committee and Technical Advisory Group was developed, and membership in both committees was finalised. The CRB database design was finalised and the database was launched with ongoing data entry coming from the Solomon Islands and Fiji. Additionally, the CRB training manual was finalised and published.

Plant Health Clinic (PHC) diagnoses continued during 2020, with LRD providing technical support to Fiji, Samoa, Tonga and the Solomon Islands. Approximately 315 diagnoses from the target countries were made. Over 260 farmers benefited from the Plant Health Clinic activities, with common diseases of key crops established. Additionally, one PHC Refresher training each was conducted for extension officers in Fiji and the Solomon Islands. PHC awareness was also part of the Fiji Agricultural Show in Nadi. Finally, drafting of the Plant Health Clinic manual was completed in Quarter 3 during the year to support extension services in pest and disease surveillance and diagnostics at the farmer field level.





Conventional farmer turns organic and finds more than economic gains

There is an increasing demand for organic products in New Caledonia and across the Pacific. This motivates the region's farmers, and more and more of them are transitioning to organic farming.

Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Certification and labelling for organically grown food items and products has been developed to provide consumers with the means to clearly identify products they seek in terms of nutrition, ecology or ethics. Organic certification is demand driven and determined by the market.

LRD, through its Pacific Organic and Ethical Trade Community (POETCom) initiative, established an alternative, locally managed, low-cost certification system based on peer auditing called the Participatory Guarantee System (PGS). The system supports the growth of the organic and ethical trade movement and contributes to a productive, resilient, sustainable and healthy Pacific Islands region. LRD has been helping farmers gain access to the organic market, and is also the developer, owner and custodian of the Pacific Organic Standard.

In 2009, POETCom helped with the formation of the Bio Caledonia Association PGS Group. The Bio Caledonia association was created to provide organic producers with a guaranteed tool to better market their products. Bio Caledonia now has about 95 producers that are certified organic representing 1,287 hectares of organic certified land in New Caledonia.

POETCom offers trainings and capacity building on organic production and certification, working in partnership with its farmer organisations and PGS groups in the region. One such exchange happened in New Caledonia in November 2019 in which Louis Ate participated. Louis is a New Caledonia farmer that recently transitioned from conventional to organic farming. The benefits Louis gained surpassed his one motivating factor, which was economic gain.

Louis came to realise that providing healthy and quality food for his family and community was equally important. Along the way he learned to appreciate and maintain the health of the environment that sustains his livelihood. He improved his agricultural practices through the Bio Caledonia Association and POETCom's trainings and information sharing. Motivated from the training, he established a local PGS cluster within his tribe, the Konoyes-Chaoué in Kouaoua, and became the tribe's first PGS Bio Pasifika certified organic producer. This further motivated other farmers that are also turning to organic farming, with two farmers now PGS certified and three others in transition.

The transition to organic farming has also brought about a lot of behavioural changes in Louis. He has expanded his small field and orchard. He now grows more citrus trees – particularly the local mandarin that is a speciality from his region. Though he initially did not pay much attention to waste management and would burn many things among his crops, he has now found a way to use his waste. He is taking better care of soil health and the environment.

Louis is hoping to get his farm certified organic, which will provide him better market opportunities. Building this type of capacity in farmers is an important first step in bringing about behavioural change. Organic practices can motivate conventional farmers to make the switch and expand their livelihoods and environment. This, paired with the intensive and participatory nature of the PGS system, contributes to strong ownership and sustainability, helping more farmers to go, and stay, organic



Contributing to the SPC Objectives and UN Sustainable Development Goals

SPC Objectives

In 2020, LRD worked to further integrate its work into the SPC's overall development goals. The SPC Strategic Plan 2016-2020 has nine development objectives that fall under SPC's three main goals. LRD's mandate within SPC empowered it to contribute to five of the nine objectives, which have been marked in bold below.

Goal 1: Pacific people benefit from sustainable economic development

- 1. Strengthen sustainable management of natural resources
- 2. Improve pathways to international markets
- 3. Strengthen sustainable transport and energy security
- 4. Strengthen access to and use of development statistics in policy development and monitoring progress

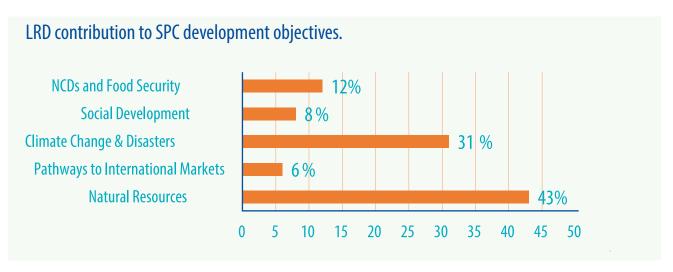
Goal 2: Pacific communities are empowered and resilient

- 5. Improve multi-sectoral responses to climate change and disasters
- Advance social development through the promotion of human rights, gender equality, cultural diversity, and opportunities for young people

Goal 3: Pacific people reach their potential and live long and healthy lives

- 7. Improve multi-sectoral responses to noncommunicable diseases and food security
- 8. Strengthen regional public health surveillance and response
- 9. Improve education quality

The LRD Business Plan 2019–2023 is aligned to the SPC Strategic Plan 2016-2020 for the year. An end of year analysis and evaluation indicated that LRD achieved 51 major results during the year. Of the 5 SPC Development Objectives to which LRD contributed, 22 results were reflected under Development Objective 1 (Natural resources); 3 results under Development Objective 2 (Pathways to international markets); 16 results under Development Objective 5 (Climate change and disasters); 4 results under Development Objective 6 (Social development) and 6 results under Development Objective 7 (NCDs and food security). LRD's contribution to SPC's development objectives is depicted in the graph below.



Sustainable Development Goals

SPC strengthened its emphasis on contributing to the achievement of the UN Sustainable Development Goals in 2020.

LRD's contribution to the SDGs mainly focused on No Poverty, Zero Hunger, Gender Equality, Reduced Inequalities, Life on Land and Responsible consumption and production. LRD also has a secondary contribution to other goals such as partnerships for the goals, climate action, good health and well-being, responsible production and consumption and industry innovation and infrastructure.

LRD specifically contributed to the following goals:







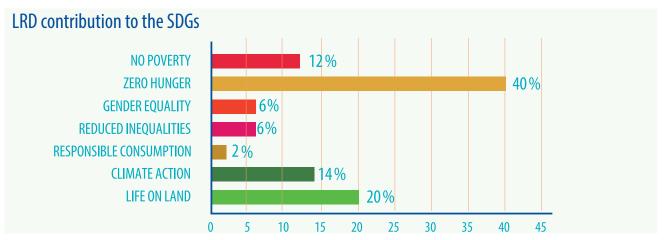








The chart below breaks down the contribution of LRD's 51 results to the Sustainable Development Goals for the year by percentage.



Partners and Resources

LRD sought to expand its programme and project base in 2020 while also ensuring that resources were better targeted and used more efficiently. Programmes and projects were centred around LRD's four main themes, or Pillars, that are cross-cutting and integrated. The four Pillars are:

- Genetic resources
- Sustainable forests and landscapes
- Sustainable agriculture
- Markets for livelihoods

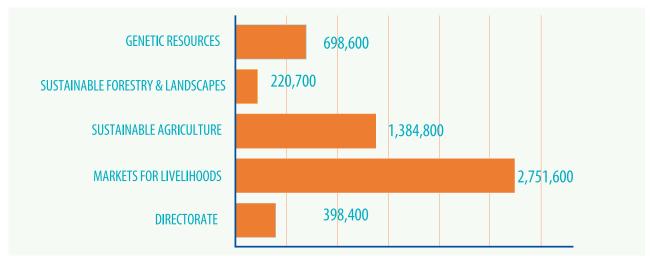
These pillars are connected through six integrated programmes currently under development:

The four pillars benefited from a funding mix that is categorized into two primary components, unrestricted, or core, funding, and restricted funding or project funding, which is primarily used for projects. In 2020, project funding totalled 5,454,100 Euros, with core funding totalling 1,441,500 Euros. See graph above.

In terms of total project funding of Euro 5,454,100, the highest is for Markets for livelihoods with Euro 2.751.600, followed by Sustainable agriculture, with Euro 1.384.800, Genetic resources with Euro 698,600, the Directorate team with Euro 398,400, and Euro 220,700 for Sustainable forestry and landscapes. This is illustrated by the graph below.



21% (1,441,500)



LRD received its funding for the year from ten major partners.

- 1. Government of New Zealand
- 2. Government of Australia
- 3. European Union
- 4. Global Crop Diversity Trust
- 5. IFAD (International Fund for Agricultural Development)
- 6. SPREP (Secretariat of the Pacific Regional Environment Programme)
- 7. FAO (Food and Agriculture Organization of the United Nations)
- 8. GIZ (German Development Agency)
- 9. UNDP (United Nations Development Programme)
- 10. KEW Royal Botanic Gardens

New and ongoing programmes and projects funded by these partners also benefited from collaboration with a number of universities and learning institutions. These include the following below, listed with area of collaboration.

- 1. University of Tasmania, University of Adelaide, CSIRO, LandcareNZ: Soils projects.
- 2. Southeast Asian Regional Centre for Graduate Study and Research in Agriculture: Extension services for smallholder farmers.
- 3. University of the Sunshine Coast, University of Adelaide: Tree crop systems.
- 4. Griffith University, Southern Cross University, National Agricultural Research Institute (NARI), University of Adelaide, CSIRO: Forestry.
- 5. University of Western Australia, University of Sydney, University of South Pacific, University of Auckland: Climate Smart agriculture.
- 6. Central Queensland University, University of the Sunshine Coast, University of Queensland: Vegetable production systems.
- 7. University of Queensland: Coconuts
- 8. University of Sunshine Coast: Policy drivers

Our funding and learning institution partners collaborated with LRD under the four main pillars to work toward the following outcomes.

- Increased availability of, and access to, traditional and improved crop and animal diversity (agrobiodiversity conserved, developed and promoted).
- Development and strengthening of protocols for effective provision of planting materials to national seed networks.
- Development of the Centre for Pacific Crops and Trees (CePaCT) as a Centre of Excellence.
- Further research with international partners such as the French Agricultural Research Centre for International Development (CIRAD), International Atomic Energy Agency (IAEA), Consultative Group on International Agricultural Research (CGIAR), Australian Centre for International Agricultural Research (ACIAR) and national research centres to build regional and national capacities in key areas, such as development of gene banks and nurseries, protocols for mass propagation, crop development, evaluation and selection, and pest and disease testing and elimination.
- Increased capacity for sustainable land management and sustainable forest management.
- Development and strengthening of national and regional capacity to mitigate and adapt to climate change impacts, and to respond to the effects of disasters on land, agriculture and forest resources.

- Increased capacities in implementing the concepts of the Voluntary Guidelines on the Responsible Governance of Tenure and participatory land-use planning, and responding to members' requests for assistance in developing effective land-use policies and plans.
- Development, introduction and scale-up of agroforestry models in Micronesia and the smaller atolls in Melanesia and Polynesia to contribute to food and nutrition security, more efficient crop and livestock production, and promotion of markets for high-value tree products.
- Participatory development of agroforestry, crop and livestock productivity-enhancing technologies (development of crops resilient to salinity and climate change; adaptation and mitigation strategies; improved soil health, livestock and agroforestry systems; integrated crop management; and strengthening of extension, research and technology transfer).
- Enhanced divisional awareness and understanding of climate change and other key issues for agriculture and forestry.
- Improved dissemination and adoption of new agricultural production technologies.
- Strengthened division capacity to make evidence based policy decisions on food security, sustainable resource management and economic growth.
- Increased capacity of PICTs to meet international standards, guidelines and conditions for export and domestic trade, and improved information on plant and animal health status.
- Enhanced smallholder (including women and youth) participation in local, domestic and international markets: sustainable and viable postharvest technologies developed and promoted; increased production and consumption of local nutritious foods; sustainable, productivityenhancing technologies for livestock; and participatory practices developed and promoted.
- Development of protocols to enable farming families to establish sustainable food crops (in terms of quantity and quality); assistance for member countries to build social capital in food production, marketing and business ethics; and promotion of participatory guarantee systems and clusters.
- Leadership of a youth employment/'agri-preneur' programme, with a focus on equitable access to existing resources and employment opportunities for youth, women and minorities.





Looking ahead to 2021

There is no doubt that 2020 was a challenging year for all, including LRD. The pandemic caused by COVID-19 quickly made it to many shores in the Pacific, necessitating a complete re-think of how LRD implements its ambitious work plan and collaborates with its partners for impact and progress in the region.

Though many programmes and projects were delayed or had to temporarily pause during the year, LRD quickly found ways to progress. The LRD team moved to an online model, holding trainings and meetings remotely, while also continuing its normal course of distributing seeds and crops, bringing women and underserved communities into planning and implementation, and strengthening and securing new partnerships to launch an even more ambitious work plan for 2021.

LRD will build on these steps in the new year, in particular reigniting the programmes and projects that were paused and launching those that were conceived through extensive online consultations in 2020. As people throughout the Pacific get vaccinated and countries forge ahead to emerge COVID free, LRD looks to expand its trainings through the up and running Plant Health Lab, officially integrate gender and underserved communities into its strategic planning, such as the new POETCom plan, expand its work in eradicating pests and diseases, and promote core Pacific crops such as the coconut, in addition to providing other seeds and crops to agricultural communities.

LRD will also lead several vital region-wide events in 2021 that will set the course for the Pacific's future. After cancellation of the biannual Heads of Agriculture and Forestry meeting in 2020, LRD is ready to lead the meeting in August 2021 with an aspiring agenda that will include COVID recovery. LRD will also steer a series of region-wide dialogues in the lead-up to the inaugural UN Food Systems Summit in September 2021 to ensure the voice of the Pacific is prominent in this ground-breaking global event.

Resource mobilisation efforts in 2021 will focus strongly on supporting regional public goods within LRD such as CePaCT, and building the Sustainable Forests and Landscapes programme of work.

The challenges for recovery of land resources and the communities that depend on them will continue to mount post-COVID. LRD will build on the extensive programme infrastructure it introduced during the year while further interweaving its work into the larger SPC divisional family and keeping an eye on the Sustainable Development Goals. Despite a taxing 2020, our vision remains steadfast – "sustainably managed natural resources and ecosystems and equitable markets for resilient, food and nutritionally secure Pacific communities". We look forward to you joining us as we "build back better" for a thriving, resilient Pacific, today and tomorrow.