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|  | Annual report |
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# Progress summary

**A number of planning, coordination and dissemination activities were conducted:**

* The project mid-term review, undertaken by Irene Kernot, Trevor Clarke and Elizabeth Brennan was conducted in Bougainville between 1-9th August 2019. A review report was received on 14 October and responses were returned on 31 October
* The Fourth Annual Bougainville Chocolate Festival was held in Arawa on August 2019.
* A WhatsApp group and Facebook Page (currently 124 members) has been set up for the project and have proven successful platforms for engagement and communication, especially given the subsequent disruptions caused by the Covid-19 pandemic
* Annual planning meeting was held in Buka in February 3rd-12th 2020 with project leaders, managers, coordinators, VEWs. We also discussed recommendations arising from the Mid-term Review, and planned appropriate actions, and held meetings with the ABG-DPI, ABG-Health, DFAT and BP and other stakeholders
* A strategy meeting was held in Sydney in June 2020 amongst University of Sydney team members to discuss progressing activities post COVID-19.
* Two articles have been published in the journal *One Health*.
* A series of papers were written examining the international trade of Papua New Guinea cocoa beans based on the import data from select countries
* An online Bougainville Reader is being developed. The Reader comprises articles, observations and lessons learned written by team members.
* We submitted 2 press releases to DFAT that led to media coverage in local PNG Newspapers and TV.
* Several presentations were given by project members at conferences and seminars.
* Participated in discussions with ACIAR to develop research priorities for cocoa research in the Pacific
* Rapid surveys of buyers undertaken to assist ACIAR
* Participation in a number of surveys to assess the impact of Covid-19 on cocoa growers on Bougainville

**Key activities to support improving the productivity, profitability and sustainability of cocoa farming included:**

* Several trainings have been provided throughout the year to villages, with ABG-DPI, PNG-CB and UNRE staff, on compost making, demo plot set up, bud grafting, nursery set up, Family Farms Teams, rehabilitation training, clone seedling production, nutrition, water and sanitation and vegetable cultivation.
* Health and ABG-DPI staff have been upskilled in nutrition and vegetable garden cultivation as part of CRG. The interdisciplinary teams support the One Health approach and understanding that improving livelihoods requires addressing the multiple constraints farmers face.
* Provided training in chocolate making using the project supplied DPI Chocolate Laboratory
* Appointment of Borgia Sinato as DPI coordinator for the VRC network has supported the establishment of 29 VRCs
* Appointment of three UNRE Field Extension Officers has supported the establishment of income diversification through village-level vegetable and livestock enterprises

**Since the livelihood survey, a series of follow-up activities have been implemented to enhance health and nutrition of cocoa farming communities:**

* Information sessions on nutrition, water and sanitation and vegetable cultivation were conducted in the 10 villages selected for the CRG pilot study. Followed by monthly monitoring and support visits by staff from the ABG Health and PI Departments.
* Family Farm Teams training has been conducted in 3 villages with the rest to be completed in July/Aug 2020. This training reinforces and expands on the previous nutrition and vegetable garden training sessions. When farmers are trained in planned farming and understand the nutritional values of their local foods, they can apply this knowledge to their everyday to help their family grow, using locally grown produce for improved health and incomes.

**There have been some exciting developments in the area of innovation and enterprise development:**

* The utilization of goat manure as compost or direct application to crops looks promising as shown by growth parameters such as leaf size (Length x Width (cm) and weight (g) of Chinese cabbages in our small trials in Kubu, North Bougainville
* VEWs Benjamin Tatou, Martin Masen (with Malasang Womens) and Chris Poto (Chocolate festival Best of show winner) in North Bougainville were assisted with funds for their IPA registration of their farm businesses; BENJAY Business Group and POTO INTER FARM Business Group respectively. Enterprise activities will include Cocoa Nursery and seedling sales, Cocoa wet bean buying, fermentation and drying, Bud wood garden, Poultry and vegetables. All the other VEWs will be encouraged and assisted to do the similarly as and when required depending on their progress.
* Addition of development economist Assoc Prof Philip Simmons to the project teams has enabled planning for full benefit-cost analyses of improved farming models to be completed

**The project has made good progress on value chain strengthening:**

* + The Chocolate festival provided the opportunity for public diplomacy for the Australia and NZ aid programs, and for organizations such as DPI, PPAP and others to display and provide information to farmers and SME groups on income and farm diversification with vegetable/fresh produce, livestocks and Galip (PPAP) and Health.
  + Facilitating an industry wide presentation by Australian chocolate makers to cocoa growers to better enable the growers to understand what chocolate makers require
  + The 2020 Festival has been cancelled due to COVID-19. We plan to run a series of regional field days, coordinated by DPI, later in 2020 instead of the Festival. The 2021 Festival will go ahead as an ABG-DPI event.
  + Students from the University of Natural Resources and Environment and from the Highlands Agricultural College (3X Northern Hub and 3 X Southern Hub) participated in the industrial training program. Their training covered cocoa technologies including grafting, nursery practices and management, rehabilitation techniques, pollination, farmer trainings, and vegetable production. Students were also involved in conducting small projects and data collections.
  + Planning for the PNG-CB Cocoa Curriculum to be rolled out in schools near the three Hubs beginning in late 2020.

# Achievements against project activities and outputs/milestones

## Achievements to date

#### Objective 1: To improve the productivity, profitability and sustainability of cocoa farming and related enterprises

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| No. | Activity | Outputs/  milestones | Completion date | Comments |
| 1.1 | ABG, District, CoE and village consultations | Coordinated plans for development at each level, with priorities | Ongoing | ABG member for Stitalato Constituency and ABG Presidential candidate Honourable Fedelis Semoso visited Kubu, North Regional hub to visit the facilities and observe activities. They were pleased to see the old cocoa clones were rehabilitated and pledged support for the project activities with funding for cocoa work in his constituency and Bougainville in general as it is a main cash crop and income earner for farmer and government. |
| 1.2 | Baseline information collection and analysis | Monitoring livelihoods  Work with TADEP to develop M&E | Completed | Baseline data was collected in 2017. A report on the survey results was provided to the ABG Government in 2018. Two Journal articles have been published in *One Health* and 2 more (farming, gender) are in preparation*.* The results were also used to inform the CRG pilot study. |
| 1.3 | Selection of participating villages | 33 Village Assemblies selected across Bougainville-11 in each region. Selection process assisted by advice from ABG Ministry of Community Governance. | Completed | 33 villages selected 11 in each region (North, South, Central). |
| 1.4 | Training of DPI Senior Facilitators, District Officers and selected VEWs | Train 12 Senior DPI Facilitators (at MCA) then 52 District Officers and 33 village -level specialists in cocoa, foodcrops, livestock and health | Completed | * Ten DPI staff, 1 CCI officer and one UNRE staff trained at MARS Indonesia. * One DPI and one UNRE staff member trained in food crop production at World Vegetable Centre in Thailand * 33 VEWs, 3 Hub coordinators and 3 CCI Project staff with some DPI officers trained on Family Farm Teams approaches, Sustainable Livelihoods, IPDM, Pest and disease management, Clones, Budwood garden and Nursery set up, livestock husbandry as well as two business modules- small enterprises and record keeping and decision making. * Health and DPI staff upskilled in nutrition and vegetable garden cultivation as part of CRG |
| 1.5 | Establish village budwood gardens and nurseries | Establish 33 village budwood gardens and nurseries in 33 VAs | Completed | This activity has been achieved but infilling due to deaths to plants is ongoing.   * A 1 ha cocoa block has been established at Konga station (South Bougainville) for demonstration and budwood gardens * A total of 1,000 rootstocks were budded to get the best 400 out of the 1,000 for field planting. Clones are about a month old in the nursery. * Buin DPI, nursery and budwood garden supporting clonal propagation and tree rehabilitation. Fifty farmers have each been supplied with 200 seedlings. Pod pilfering remains a problem. * Out of the First Lot of 400 plantings had a high mortality rate that we lost about 2/3s of the block due to continuous raining during field budding time. * 11 VEWs got for their Nursery set-ups this reporting period at their resource centres in addition to already established ones. The plan is that in the same nursery a section will be allocated for raising vegetable seedling alongside cocoa. If the demand for supply of seedling increases, then a separate nursery each for cocoa and vegetables can be built. * VEWs were given shade cloth for nurseries construction at their resource Centers * An evaluation was conducted in Buin DPI budwood garden and assessment of the *ex situ* collection of clones to assess precocious attributes, response of IPDM inputs and yield components. |
| 1.6 | Evaluate soils and compost and fertiliser requirements | Sample soils and establish composting trials linked to resource centres | Completed | * Soil sampling was completed with 8 samples each from each region and waiting response from soil labs to compare quotes before sending. It is highly unlikely that PNG labs will be utilised due to high costs involved as well as takes a long time before results a received as experienced by the ACIAR SMCN/2014/048 project, so a better option would be to send them to India. * Additional composting shed built at VEW sites with training conducted during this reporting period in North (8), Central (2) and South (2) Bougainville * The utilization of goat manure as compost or direct application to food crops looks promising as shown by growth parameters such as leaf size (Length x Width (cm) and weight (g) of Chinese cabbages in our small trials in Kubu, North. A more advanced trial was designed and initiated involving more treatments and replications. * As part of the 2019 chocolate festival, a Field trip was run for farmers to Manetai to see demonstration of IPDM and compost production. * Composting demonstrations were provided as part of the vegetable cultivation and nutrition sessions for the CRG. * Discussions were held with Damien Field and Kanika Singh from the Cocoa Soils project (SMCN/2014/048) about future collaborations, including the development of a diagnostic app for cocoa, food crops, livestock, human and soil health. We also discussed the development and implementation of a school cocoa curriculum, perhaps in collaboration with Business for Development, an Australian NGO with similar experience in East Timor. |
| 1.7 | Establish IPDM demonstration plots | Establish 33 IPDM demonstration plots | Ongoing | * 23 demo plots were established and 10 more to reach the target of 33 demo plots. * 3 IPDM demonstration trials with 6 treatments were set up in North (sigh1), Manetai (central ) and Buin DPI station. |
| 1.8 | Establish mobile support networks | Develop, test and commission mobile and web-based apps for extension and health;  Provide smart phones / tablets to village specialists | Ongoing | * CommCare was used for livelihood and health surveys using digital tablets. * For the CRG pilot project baseline data on diets and vegetable cultivation was captured from 10 villages using the Commcare application on Lenovo Tablets. CommCare will also be used for the monthly monitoring and 12 month evaluation. |
| 1.9 | Farmer training | Training established in 33 village assemblies.  Communication and outreach (radio, social media, Bougainville Bulletin, Newsletter etc) | 7/2016-6/2019 | Farmer trainings conducted during this reporting period are;   |  |  | | --- | --- | | Training Type | Number | | Compost Making | 11 | | Demo Plot set up | 8 | | Nursery set up | 11 | | Family Farms | 3 | | Rehabilitation training | 4 | | Clone seedling production | 3,500 | | Hybrid seedling production | 15,000 | | Rootstock production | 8,000 | | Vegetable cultivation | 20 |  * DPI introduced weekly (Thursday and Tuesday) **Radio Didiman** program with NBC Bougainville for Agriculture news, activity updates and information. * A DPI blog spot (<https://dpimr.blogspot.com/>​ ) as well as the Bougainville Bulletin ([http://www.abg.gov.pg/…/re…/bougainville-bulletin-edition-14](http://www.abg.gov.pg/index.php/news/read/bougainville-bulletin-edition-14?fbclid=IwAR0aPYtpSNbGYOyIz0laH9iNtDmqUVdQHYFRcTBLeUTV9gBefUPtVZqZ3m4))are continuously been used to up load market reports and other articles on cocoa and the chocolate festival. * The project was featured in the Post Courier, National and on TVWAN   <https://postcourier.com.pg/australia-supports-bougainvilles-home-made-chocolate/>  <https://www.thenational.com.pg/cocoa-project-benefiting-2000-plus/>  <https://www.facebook.com/watch/?v=545057509539046>   * Article on *Cocoa farming tips*  by James Butubu was published as a series on Agriculture Farming Tips (Part 1 & Part 2): In Bougainville Bulletin 14th and 15th edition (<http://www.abg.gov.pg/uploads/bulletin/BB_Edition_15_November_2019.pdf>). * Project Facebook page set up page [Bougainville Cocoa & Health Project](https://www.facebook.com/groups/623998121765260/) where further discussions/ comments are made on project related issues. Currently there are 124 members. |

PC = partner country, A = Australia

#### Objective 2: To understand and raise awareness of the opportunities for improved nutrition and health to contribute to agricultural productivity and livelihoods

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| No. | Activity | Outputs/  milestones | Completion date | Comments |
| 2.1 | Establish the extent to which health and disease impacts on farming activities | Apply for Ethics approval from the relevant institutions.  Establish base line data about the health of cocoa farming families  Review the WHO health status survey tool for low resource countries  Design tool for recording days lost work to sickness or illness  Design mixed methods study to measure both health status, farming activities and days lost to illness.  Develop qualitative and quantative and tools for collecting data  ( surveys, semi-structured interview schedules, number counting, activity counting) | Completed | * Results of community health and measures linked to farming activities including days lost to illness. * Results have been provided to the ARoB Government and stakeholders. * Report has provided the evidence for the Department of Health’s strategy to reduce stunting in children. * Two papers have been published and another is under review on the health constraints of cocoa farmers |
| 2.2 | Establish Community Advisory Committees | In each participating village, the Committees will coordinate and oversee the project.  Membership to include local leader to chair the meetings and women, youth, cocoa farmers, project team | completed | Results of survey provided to stakeholder meetings in each of the 3 regions. |
| 2.3 | ABG, district CoE and village-level consultations | 1. Identify main health concerns for the community  2. Understand how the initial health needs of the community are currently met  3. Develop support applications for basic mobile phones  4. Work with DoH to develop a Cocoa Farming Health Framework (CFHF) | Ongoing | A cocoa farming health framework has been developed and expanded with a curriculum developed for health and agriculture volunteers at the village level. |
| 2.4 | Link health information to roll out of satellite farmer training | Link DoH health programs to the roll out of satellite farmer training centres | Ongoing | The Collaborative Research Grant pilot project provides information on nutrition, water and sanitation and hygiene and vegetable cultivation to a sample of 10 villages. The project supports households over 12 months to adopt new techniques to improve health, nutrition and farming outcomes. An evaluation will be conducted at the end to establish how effective the program has been.   * Information sessions on Nutrition and vegetable cultivation completed in 10 villages selected to be part of CRG. * Family Farm Teams provided to 3 villages so far with the rest of the training scheduled for July/August 2020 * One village has been excluded from the study for safety reasons. |

PC = partner country, A = Australia

#### Objective 3: To foster innovation and enterprise development at community level

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| No. | Activity | Outputs/  milestones | Completion date | Comments |
| 3.1 | Support the establishment of DPI Regional research hubs in Bougainville | Selected facilitators trained at the Mars Cocoa Academy so DPI has a network of well-supported research hubs staffed by trained scientists and technicians | Dec -2021 | * The South Hub station is fully established with a 10,000 seedling capacity nursery, a budwood garden, a new clone block and a shed built to store tools and chemical and at the same time used as a compost house. In addition to that Konga DPI station(south) now has a Vegetable nursery and 5,000 capacity Cocoa Nursery, 1 ha Cocoa demo plot, goat manure and compost application observation trial plots * While Central has no hub station, work continues with active VEWs like George Tonai to set up the Solar dryer, budwood garden and nursery. The demo plot and compost hut were also established in one of Tonai’s farmers blocks. Apart from the existing land problem for Hub development, Central coordinator Theo Kisu had initiated developing a resource centre which will include goats and other resources/facilities in a former Toboroi plantation. * North also is facing similar situation like the Central but Kubu DPI station is fully established and functional with Goats, Cocoa Nursery, Vegetable Nursery, Composting boxes, several demo and trails on vegetables and cocoa and vegetable/food crop integrated farming system and Cocoa rehabilitation demo plots. |
| 3.2 | Establish Village Resource Centres linking CCI, UNRE, AVRDC with DPI and DoH | Network of 33 Village Resource Centres | Ongoing | * Borgia Sinato was appointed in 2019 as VRC Coordinator to support the In-country Project Manager. * A visit was made to the VEWs in Jan/Feb to discuss how they are to work with their communities and Hub-Coordinators to plan and support the VRCs. Not all VRCs have buildings, but 3/11 in Central, 4/11 in the South and 2/11 in the North have community-built structures that function as broad community resource centres that include cocoa farmer training. * Issues and factors hindering progress of VRC construction were discussed and recommendations put forward to address them accordingly. One of the main challenges raised was that the VRCs are getting variable levels support from their community government and ward steering committees. The project will have regular meetings and monitoring visits with the VRCs to strengthen this working relationship. * VAs and VRCs will be surveyed to identify factors contributing to their success or failure. This survey was aligned with the one developed for the PNG Cocoa Project to enable comparisons to be made between different localities across PNG. * VRCs have been established in the North (4, plus 6 almost complete) , South ( 3 completed plus 8 almost completed) and Central (3 complete plus 8 almost complete). * Kovanis/Teonena Resource Centre is under construction after receiving support from their ABG member, the community and the project. Additional facilities such as compost hut and cocoa and vegetable nursery were recently constructed by engaging a student (Rosilda) on her industrial training. * Tohatsi VRC will be constructed soon with funding from their Community Government chairman for roofing iron and the project’s support. Most of them are now planning to construct the VRC in the new Year, 2020. * The Northern Region has 4 established VRCs while the fifth one will be completed in December as reported by VEW from Kovanis. * After the meeting in the South interest has gained momentum where there are already 4 established VRCs. Two are pending construction in Buin and Siwai Districts. They are in the stage of collecting their building materials and quotations for their hardware. Construction is yet to start in the Central region. |
| 3.3 | Develop supplementary food crop and livestock enterprises | Recommendations for cocoa crop rotations that include food and supplementary crops |  | * The shipments of 20 goats were made from the Highlands to Kieta. * Three pairs of Goats (kids) were distributed, two pairs for VEWs (Baniu and Sigh1) and one pair for Kubu * North region hub. Goat at houses were also constructed. * Observation of Goats under diversification objective continues. While those in our breeding station in Konga (South Bougainville) were being affected by internal parasites, others in North are doing well in terms of growth and manure production. * Medicines procured from RSPCA by UNRE have been administered * A team from University of Natural Resources and Environment (UNRE) with a NAQIA officer visited Goat farmers in North and South Bougainville to monitor the goat health and general growth performance. We purchased then administered the necessary treatment drugs. * Newly-appointed UNRE Extension Officers will be urgently conducting a Goat husbandry, disease and parasite treatment training * The utilization of goat manure as compost or direct application to food crops is promising, as shown by growth parameters such as leaf size (Length x Width (cm) and weight (g) of chinese cabbages and other food crops in our small trials in Kubu, North (See below). A more advanced trial was designed and initiated involving more treatments and replications. * Manure will be distributed to VEWs or put on sale for interested farmers. * Vegetables and rice seeds were distributed to VEWs to implement and show case the techniques of cocoa-vegetable/Food crop stripe cropping and for income diversification * We’ve demonstrated how vegetable cultivation can be an important source for meeting Health & nutritional requirement and income from our cocoa vegetable stripping cropping demo plot in Kubu. The first harvests were freely distributed to DPI and ABG administration staff families,   with additional production sold to the public.   * Mamaro VA with 3,000 inhabitants has established a cocoa and food crop nursery, food gardens, a waste composting facility, goats, ducks, poultry and an aquaculture setup farming Telapia under the leadership of model farmer Joe Tauro. Good income is being made, especially from cabbages. * Konga (South Bougainville) vegetable nursery constructed and used for vegetable production/trials and demonstrations. * Use was made of James Butubu’s enforced quarantining in Port Moresby during Covid to learn more about the mechanical operations of fresh produce market places. * While in POM, he conducted a survey of fresh produce marketing in POM, drawing lessons for how can we improve fresh fruit and vegetable marketing on Bougainville. * Additional training on vegetable cultivation provided through the CRG. * Work continued on documenting better handling practices of fruit and vegetables in transit and at the market place to that growers achieve higher prices and consumers get a higher quality produce. |
| 3.4 | Support economic development through enterprise development | Village communities establish diverse enterprises based around cocoa farming– nurseries, fermentation and drying, marketing, compost, block sanitation… | 7/2016-12/2021 | * Training Programs are now run by the VEWs and supported by the DPI District Extension Officers. * Budders who were trained through this project are now been time to time contracted to do budding in other commercial nurseries. * VEWs Benjamin Tatou, Martin Masen (with Malasang Womens) and Chris Poto (2019 Chocolate Festival Best of show winner) in North Bougainville were assisted with funds for their IPA registration of their farm businesses; BENJAY Business Group and POTO INTER FARM Business Group respectively. Enterprise activities will include Cocoa Nursery and seedling sales, Cocoa wet bean buying, fermentation and drying, Bud wood garden, Poultry and vegetables. All the other VEWs will be encouraged and assisted to do the similarly as and when required depending on their progress. |
| 3.5 | Monitor farming systems | Regular surveys |  | * Data collection on crop growth performance under cocoa rehabilitation is continuing. Additional factor on nutrition is also being observed with Goat manure, Cocoa pod husk and NPK. * Training commenced in the use of Cost Benefit Analysis to compare the economics of rehabilitation and replanting as grower production options. * Data collection on remaining cocoa trees at Kubu continued in March/April for yield estimation for 24 months after rehabilitation (90% canopy removal) and 6 month (50% canopy removal) respectively. Data ripe pods, mature pods and cherelles were collected * Trial demos on Cocoa based farming system (stripe cropping) with rice, Taro, kankong, Kaukau (sweet potato) and various vegetables continued in Kubu as well as Konga station. * Follow-up surveys of cocoa farmers are planned for Feb 2021. This will involve the selection and training of interviewers to administer a shorter endline farmer survey. This survey will comprise the same set of questions as the baseline survey plus additional questions about training and wet bean sales in a sub-sample of 5 VAs from each region, including 10 will be randomly selected households (150 households). * A survey will also be administered to all the VEWs in Feb 2021 to identify factors contributing to the success or failure of their activities to encourage changes in farmer practice and the sustainability of their activities. This survey will incorporate questions developed by the PNG Cocoa team to enable comparisons across the projects. |

#### Objective 4: To strengthen value chains for cocoa and associated horticultural products

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| No. | Activity | Outputs/  milestones | Due date of output/ milestone | Applications of outputs |
| 4.1 | Improve quality through better postharvest handling, fermentation and drying | Establish and evaluate cocoa drying and fermenting equipment  Guidelines for cocoa fermentation and drying  Communities adapt, build and maintain new fermenteries and dryers  Cocoa quality monitoring becomes routine | 1/2017-12/2021 | Two Combination dryers built with one more planned for the South.  Continuous training and awareness done by Julie Rereve of North Bougainville as she makes chocolates and farmers take their own samples over for testing to see if they are producing quality cocoa.  Silas is also working in partnership with the Field Services of Cocoa Board to carry out awareness and inspect cocoa fermentaries.  The ABG through DPI have now shown and are willing to fund build a bigger laboratory for commodity quality testing & monitoring and post harvest  processing R&D initially with cocoa/chocolate and others to follow on later. There has been a submission (proposal) made by ABG to source funding. |
| 4.2 | Develop cocoa value chains and market access | Key constraints analysis  Market opportunities identified | 7/2016-12/2021 | * 29 Cocoa Market Reports were produced and distributed to >170 recipients * Because of the extensive number of photos taken at the Cocoa of Excellence and Salon du Chocolat in Paris, and afterwards during market research in the UK, a photobook was printed and distributed to key stakeholders * The Taste and Tell event was held in Melbourne on 20 March 2019 . The event was very successful bringing together Bougainville cocoa producers (Steven and Elizabeth Saveke winners of the 2018 Chocolate Festival) and Australia’s leading chocolate makers. The event was an opportunity to connect the chocolate makers with the producers and showcase Bougainville as a producer of world-class cocoa beans. * DPI Chocolate Laboratory in Buka was equipped with a fryer for roasting and grinder for making chocolate powder. * We initiated data collection on power consumption in roasting and nib grinding to assess the possibility of small scale chocolate making and other cocoa based products. * Training in establishing the costs of producing value-added cocoa products was commenced. Some of our preliminary work established that: * 1-Power usage or the output of our grinder was 0.175KW-h which costs K0.70/hr. Volume of beans grinded shows respective electricity costs as K0.915, K1.37 and K1.83 for 0.5kg, 1.0kg and 1.2kg of beans. Their respective optimal grinding time to produce commercial type (excellent particle size) chocolate were 4,6 and 8 hours. * 2-The total liquor output excluding wastage were 0.33kg, 0.83kg and 1.03kg with their corresponding waste of 34%,17% and 14.17% for the 0.5kg,1.0kg and 1.2kg nibs grinded * 3-The total liquor output excluding wastage were 0.33kg, 0.83kg and 1.03kg with their corresponding wastage of 34%,17% and 14.17% for the 0.5kg,1.0kg and 1.2kg nibs grinded * 4 The production of 70g chocolate bars increased proportionally to volume/weight to 5,12 and 15 bars respectively which when sold at K3.00/bar returned an income of K7.5, K11,25 and K25.75. * 5- Gross margins of K1.8, K13.65 and K19.25 were estimated for batches of 0.5kg,1.0kg and 1.2kg ground nibs, showing potential for local chocolates. Sale income were based on selling price of K3 for a 70g bar, and more detailed analysis can be made later using other prices and shapes and sizes. * Activities continued at the DPI Chocolate laboratory. Farmers dry bean samples were assessed for quality attributes and small chocolate samples made for farmers to taste the end product. * Efforts to increase the capacity of the Laboratory were stalled because of the unavailability of equipment from international suppliers. It was anticipated that additional roasters and butter fat analysis machine was needed to enhance the further the operations and additional chemical analyses but our agents could not supply as yet. * Grant Vinning developed a series of papers examining the international trade of Papua New Guinea cocoa beans based on the import data from select countries. * DPI are currently working on designs for packaging for locally produced chocolate * There was a continuation of the activity of extending information regarding the formation of world cocoa prices into the more distant cocoa growing regions. * Covid-19 has resulted in requests to provide information to a large number of individuals and organisations on impacts to the cocoa and chocolate industries. |
| 4.3 | Extension, education and capacity building | DPI Officers trained in cocoa management  VEWs established and supported in 33 participating VAs | 7/2017- 12/2021 | * DPI officers together with VEWs were already trained in 2017 but continue to learn new technologies through collaborative efforts with the project staff and the DPI officers. * Supported 1 X UNRE officer and 1 X southern hub coordinator to attend Vegetable Cultivation training at WVC in Thailand. These officers supported DPI staff to provide the vegetable cultivation training to 10 CRG villages. * VEW training in each region to be conducted by February 2021. Training will include information on water and sanitation (pit toilets)/nutrition/vegetable gardens. The training will be delivered providing the underpinning knowledge and theory as well as demonstrating how to provide the information to farming households and villages. |
| 4.4 | Link resource centres with schools/technical colleges to facilitate technology/skills training and transfer | IPDM plots located near schools/colleges | 7/2016-12/2021 | * The PNG-CB Cocoa Curriculum is to be rolled out in schools near the three Hubs in 2020. An opportunity to support VEW involvement in building school gardens was followed up with Food Plant Solutions who have designed packages for schools in the Sepik, Solomon Islands and Vietnam. |
| Cocoa management, food crops, livestock, business and health included in, and enriches, curriculum |  | * Pilot training for teachers still pending. Will be roll out after the curriculum committee seats for a meeting and gives a go ahead. Sample textbooks were being distributed to them upon their request. * Students from the University of Natural Resources and Environment and from the Highlands Agricultural College (3X Northern Hub- Shantiel, Sylvester and Rosilda, 3 X Southern Hub) participated in the industrial training program. Their training covered cocoa technologies including grafting, nursery practices and management, rehabilitation techniques, pollination, farmer trainings, and vegetable production. Students were also involved in conducting small projects and data collections. |
| 4.5 | Chocolate Festivals and field days | Annual events including chocolate judging, farming and health training | 7/2016-12/2021 | * The 2019 Bougainville Chocolate Festival held on the 7th-8th August in Arawa The festival provided the opportunity for Public Diplomacy for the Australian and NZ Aid Programs, and for organizations such as DPI, PPAP and others to display and provide information to farmers and SME groups on income and farm diversification with vegetable/fresh produce, livestock and Galip (PPAP) and Health. * A meeting was held in Arawa on 3 October to review the 2019 Bougainville Chocolate Festival. The meeting was attended by representatives from Bougainville Partners, ACIAR, DPI and growers from Siwai, Buin, and Arawa regions. The review looked at issues associated with grower involvement as well as the festival itself. * Festival Steering Committee meeting held on 8th October. * An assessment of bean quality, progression on cocoa quality improvement and capacity building across each of the Bougainville Chocolate Festivals has shown a steady improvement across the project lifespan. * Discussions have been held with Paul Bedggood from Bougainville Partners about the 2020 Chocolate Festival, which has to be cancelled due to the pandemic. We agreed to run a series of regional field days, coordinated by DPI, later in 2020 instead of the Festival. The 2021 Festival will go ahead as a DPI event. |

## Summary of achievements to date (for ACIAR website)

**This Summary will be published on the ACIAR website** and should be written in  dot- point format, minimising the use of scientific jargon and acronyms **(no more than 250 words).**

Please note that this summary will be made publicly available on ACIAR's website and in other communication materials. Do not include any commercially or institutionally-sensitive material in this summary (this information should be included in section 8).

Enter text (no more than 250 words)

This interdisciplinary project has developed strong partnerships between the ABG-Department of Primary Industries, Department of Health, PNG-Cocoa Board, the PNG University of Natural Resources and Environment, The University of Sydney and industry stakeholders focussing on improving the productivity, profitability and welfare of Bougainville cocoa farming villages. We have provided training and support opportunities for capacity building of project staff and local enterprises. Our innovative One-Health approach recognises the fundamental significance of community health, sanitation and nutrition to economic and social development. We have recruited 33 communities into our project and use the Family Farms Teams approach to identify community goals and to provide skills and training to improve cocoa productivity and quality, food crop and livestock production and enterprise development. We are working with our colleagues in the PNG Cocoa Project to identify factors that support the success of these community-level interventions. We have supported the Autonomous Government of Bougainville’s efforts to develop the capacity to support planning for a sustainable economic development of the cocoa industry. We have worked with stakeholders in Bougainville, PNG and Australia to identify and resolve marketing and trade issues so that growers are rewarded for improved cocoa quality and production. Our annual Bougainville Chocolate Festival is a celebration of the culture and hard work of the Bougainville people and provides a unique opportunity to promote the Australian and NZ aid programs.

**Project Stories**

If your project has a significant impact story or standout achievement that could potentially be shared by the ACIAR Outreach Team, please provide further information via question prompts at the link. [Project Stories](https://www.cognitoforms.com/ACIAR1/ProjectStories)*.*

# Impacts

## Scientific impacts

## Our findings demonstrate that poor education, the lack of financial incentives and planning, poor health, sanitation and nutrition are major constraints to improving the livelihoods of cocoa farmers in Bougainville. Without addressing these issues, it is unlikely productivity levels will change.

* We have demonstrated that rehabilitation of existing cocoa plantings provides greater continuity and security of farmer incomes than cutting and replanting, as profitable production resumes within 18 months rather than several years
* The use of ice block plastics and kiwi knives for budding that we introduced is now widely used in Bougainville even in some commercial nurseries. Awareness for using these materials and tools was provided at the 2017 Chocolate Festival.

## Capacity impacts

## DPI Officer Julie Rereve was awarded a Certificate IV level short term Australian scholarship on Agri-Business for training at the University of New England in November 2019 - February 2020. Julie manages the DPI Chocolate Laboratory in Buka, a facility capable of turning beans into chocolate that serves as an experimental and training facility. From the Classwork and site visits to some Agribusiness operations in Australia she learnt 1) how to start and do business using agricultural products (cabbage, chicken, cocoa) by identifying opportunity within an area and starting small with whatever materials or resources available locally, targeting local areas first. She recognised the importance of passion for growth and further development with a business created. 2) farm diversification activities create a backup income stream and increase incomes, especially for women, and 3) project leadership skills, small business management skills such as book /record keeping, risk management skills and understanding Supply chains and Value Chains.

## Visitors to the Chocolate Laboratory included 11 students and teachers, 3 Senior ABG Departmental staff, 3 ABG Politician/Parliamentarians, 2 private business people, 1 cocoa exporter and 15 farmers. Sixteen farmers cocoa bean samples were tested for their processing characteristics and the facilities were used for further quality improvement.

## Experimental samples of chocolates were also made testing the effects of different grinding times for chocolates on consumer preference and blending beans of different quality in different proportions on the final flavour.

## ACIAR John Dillon Fellowships were awarded to senior DPI Officers Wendy Sawa and Kenneth Dovaro. Wendy Sawa, Area Manager for DPI in North Bougainville in charge of HR issues and Training, said after going through the leadership course she thinks her strength is in working on Organization structures and capacity building.  She is now deeply involved with working to establish the BACRA (Bougainville Agriculture Commodity Regulatory Authority) structure and functional statements and Job descriptions for the Job positions created. There are weaknesses that she thinks she can work on improving and developing further as a leader in DPI. Her interview after training at Sunshine Coast University is in ACIAR iJDJ 2019 Wendy Sawa ([https://www.youtube.com/watch?v=TjQvPykjZ1k](https://protect-au.mimecast.com/s/CkX0Cq71mwfDwyKxfZ3ScJ?domain=youtube.com))

## Kenneth Dovaro, Director of Agriculture & Livestock in ABG-DPI, says he can now see things in a more holistic way than before which is a new experience after going through the iJDF training. ‘’As a leader I have discovered my potential and what areas to improve on as well as my weaknesses in my role’’. With this training Kenneth is now focusing on policy development framework, program coordination and motivating other officers in DPI in order to achieve organization goals. Some of his comments were captured in an interview in ACIARiJDF 2019 Kenneth Dovaro ([ACIAR iJDF 2019 - Kenneth Dovaro](https://protect-au.mimecast.com/s/z0FaCr81nytpJRPzHzWwwU?domain=youtube.com))

## The Bougainville DPI is in the process of taking over the collection of raw cocoa prices, transferring these into a format usable to Bougainville cocoa growers, and publishing and explaining international price trends. This activity was previously undertaken by the project but with the reorganising of Departmental tasks and responsibilities, this activity will be now be done by the department. The project is providing training in two broad areas - price reporting, and providing the tools that will enable the DPI to evaluate the economics of the different forms for exporting Bougainville cocoa and cocoa value-added products

* + - Students from the University of Natural Resources and Environment and from the Highlands Agricultural College (3X Northern Hub and 3 X Southern Hub) participated in the industrial training program. Training covers cocoa technologies including grafting, nursery practices and management, rehabilitation techniques, pollination, farmer trainings, and vegetable production. Students were also involved in conducting small projects and data collection.
    - Project staff have been trained at the Mars Cocoa Academy in Indonesia and at the World Vegetable Centre in Thailand.
    - Integrating the One-Health approach has facilitated understanding of the links between health and productivity at the community and government levels in Bougainville and has been translated into policy.

## Community impacts

* VEWs Benjamin Tatou, Martin Masen (with Malasang Womens) and Chris Poto (Chocolate festival Best of show winner) in North Bougainville were assisted with funds for their IPA registration of their farm businesses; BENJAY Business Group and POTO INTER FARM Business Group respectively. Enterprise activities will include Cocoa Nursery and seedling sales, Cocoa wet bean buying, fermentation and drying, Bud wood garden, Poultry and vegetables. All the other VEWs will be encouraged and assisted to do the similarly as and when required depending on their progress.
* Mamaro VA with 3,000 inhabitants has established a cocoa and food crop nursery, food gardens, a waste composting facility, goats, ducks, poultry and an aquaculture setup farming Telapia under the leadership of model farmer Joe Tauro. Good income is being made, especially from cabbages.
* Family Farms training programs have developed community capacity in planning and goal setting, financial literacy, respectful relationships, anger management, conflict resolution and gender equity.

### Economic impacts

* Generally, the economic status of cocoa farming families is improving due to the knowledge and skills taught to them being put into practice. As well, some have rehabilitated existing cocoa or started new plantings that should come into production in 2-3 years’ time.
* We are encouraged by the observation so far on half (50%) canopy rehabilitation pruning and intercropping over a temporary period. Food security and nutrition can be all addressed together with cocoa farming simultaneously with this technique however more data is needed. For the old Cocoa trees, there has being noticeable effect on the remaining 50% of the branches/ canopy in terms of increased flowering and pod production.
* We have demonstrated how vegetable cultivation can be an important source for meeting health & nutritional requirements to address malnutrition, and to provide income from our cocoa/vegetable intercropping demo plot in Kubu.
* Vegetable production and sales by some farmers, especially women, is proving to be a viable diversification alternative with cocoa as seen from the initial high local market demand in Buka, Arawa and Buin towns.
* The utilization of goat manure as compost or direct application to food crops increases vigour and growth parameters such as leaf size (Length x Width (cm) and weight (g). Goat Manure can also be sold to other farmers.
* Budders and pruners who were trained through this project have been contracted to work in other commercial nurseries, examples of enterprise development generating extra income.

### Social impacts

* Family Farm Teams trainings in this project provide mechanisms to heal historical conflicts remaining from the Crisis, and also recognition of the benefits of gender equity, community goal-setting, development and financial planning
* Since the initial nutrition and vegetable cultivation information sessions were conducted as part of the CRG, we have recorded self-reported changes being implemented within the communities to improve their health, nutrition and vegetable cultivation practices. Such changes have included adding gates on kitchens to keep animals out, improving preparation and storage of food, improving how drinking water is collected and stored, adding more variety into diets and building compost bins. These small but important changes could lead to improvements in health and nutrition and the overall productivity of these cocoa farming communities.

### Environmental impacts

* Better management and rehabilitation of old (over 20 years) cocoa trees improves productivity and reduces the incentive for further forest clearing. Therefore, most our farmers now use old and existing blocks to under plant and rehabilitate to get more production rather than cutting down new forest to plant cocoa
* Goat manure is being used for the preparation of composted fertilisers that improve soil health.
* Following the CRG information session on water, sanitation and hygiene a number of communities have been putting in place measures to improve drinking water quality.

## Communication and dissemination activities

* Monthly Cocoa Marketing Newsletter is distributed widely by Grant Vinning.
* Bi-monthly reports prepared for TADEP.
* Project Facebook page set up page [Bougainville Cocoa & Health Project](https://www.facebook.com/groups/623998121765260/) where further discussions/ comments are made on project related issues.
* 2 papers have been published in the Journal One Health, another paper is under review and one more being finalised.
* Grant Vinning met with colleagues from the Department of Economic Development in October 2019 to discuss the economics of exporting cocoa. He continues to lead discussions on development priorities with BP, MDF and PHAMA-2.
* Two articles have been written for wider distribution following the 2019 Chocolate Festival. One dealt with the training of school students in chocolate making, the other on how the project is using the judging process for the Chocolate Festival as a vehicle for capacity building in the assessment of quality of the final chocolate.
* The project was featured in the Post Courier, National and on TVWAN

<https://postcourier.com.pg/australia-supports-bougainvilles-home-made-chocolate/>

<https://www.thenational.com.pg/cocoa-project-benefiting-2000-plus/>

<https://www.facebook.com/watch/?v=545057509539046>

* A Bougainville Reader is being developed. The Reader comprises articles, observations and lessons learned written by team members.
* **CSIRO/DFAT workshop on SGD2.**

Professor Guest was invited to a workshop convened in Canberra on 14 August 2019 to prioritise pathways towards achieving Sustainable Development Goal 2.3: “Doubling agricultural productivity and incomes in Southeast Asia and the Pacific”. A consensus was reached that the most likely pathway to succeed was through crop and livestock diversification similar to Objective 3 in the Bougainville project.

* **IFPRI report on food insecurity in PNG**

Professors Walton and Guest attended the launch of a DFAT-funded study at the World Bank office in Sydney (February 2019). The survey included a sample of villages in South Bougainville and concluded that there was potential for climate-change impacts on food security.

* **GAIN Workshop on Cocoa farming families**

Professors Walton and Guest attended a University of Sydney/GAIN Public- Private Workshop on Workforce Nutrition in Utrecht, Netherlands from 19-20 September 2019. We are working with GAIN (Global Alliance for Improved Nutrition) to better understand how chocolate companies can support the livelihoods of smallholder cocoa farmers. We developed a proposal to investigate the impact of farmer family health and nutrition on living incomes based on our research in Bougainville.

* Professor Walton attended and presented at the ACIAR project leaders workshop in Brisbane on 14th November 2019
* Annual planning meeting held in Buka in February 3rd-12th 2020. Discussions were based on the four components’ progressive and outstanding activities. There were achievements highlighted and challenges faced and the way forward recommended
* David Guest, Merrilyn Walton and James Butubu, along with other cocoa researchers, contributed over several weeks in May-June 2020 to online discussions with ACIAR about research priorities for cocoa in the Pacific. A face-to-face discussion is planned after the Covid travel restricitions are lifted.
* Grant Vinning held discussions in Melbourne with some chocolate makers as to what would they like to see as part of ACIAR’s research priorities for Pacific cocoa. Most of their concerns centred on the logistics of moving cocoa from Bougainville to their facilities in Australia and New Zealand. A major issue is the cost and complications of freight. This is considered beyond the scope of an ACIAR project. Another area of concern is local cocoa bean storage.
* Grant Vinning developed a series of papers examining the international trade of Papua New Guinea cocoa beans based on the import data from select countries.

# Training activities

* Training for rehabilitation of old hybrid cocoa trees (34 years) was conducted in November 2019 in Hangan village (North).
* Training on clone seedling production continued throughout November and December 2019 in the VEWs and farmer sites in all regions. This also included utilization of their budwood gardens that are maturing and ready for planting. Other training included cocoa pod husk compost production and cocoa pruning.
* Students from the University of Natural Resources and Environment and from the Highlands Agricultural College (3X Northern Hub, 3 X Southern Hub) participated in the industrial training program in December 2019. Their training covered cocoa technologies including grafting, nursery practices and management, rehabilitation techniques, pollination, farmer trainings, and vegetable production. Students were also involved in conducting small projects and data collections.
* The ‘Malassang Youth in Cocoa’ group were assisted with nursery materials in December 2019 and trained in cocoa and vegetable nursery establishment. They will also be trained in grafting, cocoa rehabilitation compost and vegetable production.
* As part of the CRG, Family Farm Teams training was conducted by certified trainers Josephine Saul-Maora and Robert Taula from Monday 16th to Tuesday 24th March, 2020. The 2-day trainings were held at Tohatsie, Ben Matie and Kovanis villages. FFTs in Central and South are scheduled for July/Aug 2020.
* North VEW in Novah-2, Kovanis and Tohatsi were trained in compost production, IPDM, vegetable growing and cocoa rehabilitation
* Training of all VEWs on vegetable production, old cocoa rehabilitation and food crop intercropping at Kubu and Malasang1 in February 2020

# Intellectual property

Nothing to Report

# Variations to future activities

A project variation was approved in 2019 with the main goal of transferring funds to ABG-DPI to bring the Project Manager’s salary packages inline with ABG rates, and to appoint a VRC Coordinator.

We aim to continue planned activities as much as possible under the uncertainties imposed by the COVID-19 pandemic. Disruptions have included a State of Emergency in Bougainville and travel restriction for all PNG and Australian based staff.

# Variations to personnel

* Thee Bougainville Project Leader, Thomas Betitis, passed away after a protracted illness. His leadership was vital for our project and is sadly missed.
* James Butubu, Project Manager, has taken over leadership responsibilities.
* Borgia Sinato joined the team as village resource centre coordinator to support and monitor the work on establishing the 33 Village Resource Centres. He works with ABG-DPI and is based in Buka.
* Associate Professor Phillip Simmons, an agricultural economist specialising in Development Agriculture has joined the project team to evaluate economic benefits of the project activities

# Problems and opportunities

**Problems**

* The illness and death of Thomas Betitis, Secretary of the ABG-DPI and Bougainville Project Leader, was a significant blow to the project team.
* The State of Emergency in Bougainville in 2020 prevented travel and field activities for several weeks but was lifted in mid-June. Josie Saul-Maora and Robert Taula returned to Rabaul after being stranded in Arawa from 17th March- 25th April when the SoE was imposed while they were conducting FFT. James Butubu returned to Buka after being stranded for several weeks in Port Moresby (23rd march to mid May). While there James met ACIAR and DFAT staff at the Australian High Commission. Project activities have recently recommenced.
* Australian project team members have been unable to travel since March 2020 and there is no indication when travel restrictions will be lifted.

**Opportunities**

* More frequent use of platforms like messaging, Whatsapp and email to maintain team contact during the Covid travel restrictions
* Use of the project Facebook page, Radio Didiman broadcast and other media to increase awareness and coverage of project activities
* The project team has used the opportunity to plan the transfer of responsibility to our Bougainville partners in anticipation of project completion.
* We plan to prepare for the end of project review in early 2021, including priorities and recommendations for future research.
* UNRE will appoint 3 Field Extension Officers to expand the food crops and livestock components of the Hub and VEW programs
* In collaboration with the PNG Cocoa Project, we aim to identify factors that contribute to the success or failure of our Hub and Spoke model, including the most effective ways of supporting VEWs and VRCs.
* Building strong relationships with project partners by preparing Press Releases promoting project achievements for approval and distribution by the AHC

# Budget

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# Appendices

Appendix 1: Annual Project Report Appendix One Publications list (See link on ACIAR website - Microsoft Excel document)

Appendix 2: Project Media coverage

Appendix 3: Publications

Walton M, Hall J, van Ogtrop F, Guest DI, Black K, Beardsley J, Totavun C, Hill-Cawthorne G. 2020. The extent to which the domestic conditions of cocoa farmers in Bougainville impede livelihoods. [*One Health* **10**, 100142](https://doi.org/10.1016/j.onehlt.2020.100142)

Walton M, Hall J, Guest DI, Butubu J, Vinning G, Black K and Beardsley J. 2020. Applying one health methods to improve cocoa production in Bougainville. [*One Health* **10**, 100143](https://doi.org/10.1016/j.onehlt.2020.100143)