

**ENVIRONMENTAL AND SOCIAL BASELINE REPORT
AND
IMPACT ASSESSMENT**

FOR THE

**PNG AGRICULTURE COMMERCIALIZATION AND
DIVERSIFICATION PROJECT (PACD)**

**Prepared for the Department of Agriculture and
Livestock**

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A. INTRODUCTION

This report is the second part of the Environmental and Social Framework (ESMF) for the Agriculture Commercialisation and Diversification (PACD) Project funded by the World Bank (WB) and delivered by the Department of Agriculture and Livestock (DAL) in Papua New Guinea (PNG).

This report will largely focus upon the rural population, whom are heavily engaged in, and reliant upon, commercial and subsistence agriculture.

Part One comprises baseline data at the national, regional, provincial and household level.

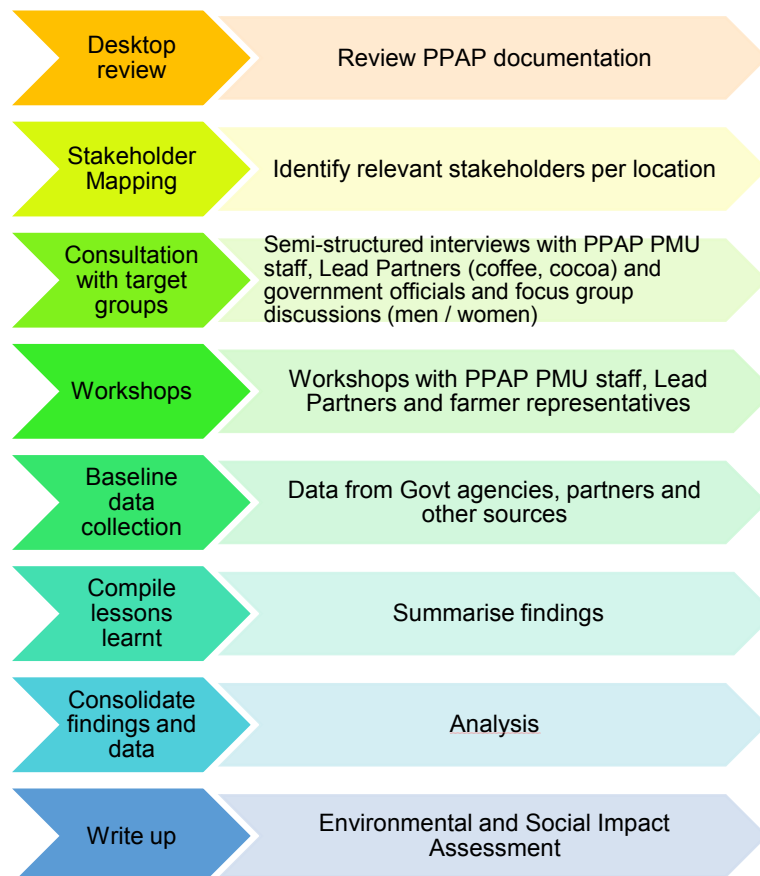
Part Two comprises a high-level environmental and social impact assessment due to widespread nature of project activities across the country.

A.1 Methodology

A study team was engaged by the Project Coordination Unit (PPAP) to develop this report and subsequent safeguard instruments. There were three phases to the scope of work:

- Phase One comprised an effectiveness review of safeguards issues and management, which included
 - a desktop review of relevant PPAP documents
 - consultation with PMU Cocoa in Kokopo and the PMU Coffee in Goroka
 - workshops with Lead Partners
 - participation in farmer gender workshop in Goroka
 - focus group discussions (FGDs) with farmer groups.
- Phase Two comprised field work in Madang, Lae and the Autonomous Region of Bougainville (ARB), which included
 - focus group discussions with farmer groups
 - key informant interviews with government officials and industry partners.
- Phase Three comprised data consolidation and write up.

The field work took place between December 2018 and February 2019.



A.2 Project Description

The project development objective (PDO) for PACD is to facilitate the development of competitive and diversified agriculture value chains in targeted provinces of PNG. The PDO supports the Government of PNG's National Strategy for Responsible and Sustainable Development through the Medium-Term Development Plan (MTDP) III. Agriculture is listed as a priority under MTDP III; particularly the revival of coffee, cocoa and tea sectors, as well as increasing access to funding support for small-scale farmers. The PACD will directly contribute to achieving these objectives through expanding the work done under PPAP to include more coffee and cocoa farmers, as well as diversifying commodities, and therefore farmer access to extension services, finance and markets.

The project has a five-year implementation period. Key outcomes include (i) increased smallholder farmer's and micro- and small medium enterprises (MSMEs) productivity in target value chains and (ii) increased smallholder producers' and MSMEs' access to markets in target value chains. At the local level, anticipated benefits also include greater awareness of market requirements (quality standards), access to essential market infrastructure, improved farming practices and technologies, improved collection, post-harvest and processing practices and technologies, greater climate resilience and improved access to, and quality of, extension and vet services.

The PNG Agriculture Commercialization and Diversification Project (PACD) will be delivered through five components:

Component 1: Institutional capacity building

The project will address institutional capacity gaps at (i) the central level - DAL, statutory bodies in charge of commodities (Cocoa Board, Coffee Industry Corporation, Kokonas Industri Korporasi, Spices Industry Board, Livestock Development Corporation) and links with the private sector – and, (ii) the decentralized level – provincial and district capacity to deliver services: extension, advisory and veterinary services, access to inputs.

Component 2: Agriculture feeder roads

The objective of this component is to improve the condition of feeder roads, which represent a major bottleneck for farmers' capacity to access more lucrative value chains. Together with the productive investments under Component 3, the feeder roads will improve access to markets for farmers, by cutting time and cost of transport and increase the quality of the transported products, besides having many other positive externalities for the communities.

Component 3: Productive Partnerships

The objective of this component is to increase the integration of smallholder producers, producer organizations (POs) and micro, small and medium enterprises (MSMEs) into performing, remunerative and diversified value chains. A first subcomponent will directly benefit smallholders and will build on the PPAP model and its lessons learned. It will develop and implement productive partnerships between smallholders and the private sector aimed at improving market linkages in the project areas. The focus will be to increase input, on-farm and post-harvest productivity and quality. A second subcomponent will benefit POs and MSMEs that are participating in productive partnerships of PPAP or this project, to increase their competitiveness with focus on aggregation, logistics, processing and marketing. This will ensure that aggregators and processors of smallholder produce can increase their absorption capacity and quality, and therefore increase the competitiveness of the value chains. The two subcomponents complement each other and are linked to ensure that value chains and their stakeholders can get more competitive, considering all its segments. There will be two interlinked subcomponents:

Subcomponent 3.1: On farm and post-harvest productivity, and formation of producer organizations (POs). This subcomponent will directly address the following two main bidding constraints: first being the limited aggregation of smallholder produce and lack of planning and coordination among stakeholders along the selected value chains leading to limited market integration of smallholders; and second, the low productivity and quality of the smallholder produce. The subcomponent will finance: (i) awareness raising campaigns; (ii) support to Lead Partners and associated farmers for the preparation of their partnership proposals and plans; and (iii) co-financing for competitively selected partnerships, including:

- a. **Investments:** farming equipment, infrastructure and other related inputs, such as improved

planting material (nurseries), support for rotational replanting and garden rejuvenation, more efficient and environmentally friendly post-harvest and processing technology, etc.

- b. **Technical Assistance (TA):** good agricultural practices, modern and improved technologies, post-harvest handling, financial literacy, livelihood training, PO formation and management, etc.

Subcomponent 3.2: Aggregation, value-addition and marketing. This subcomponent will directly address the following two main bidding constraints: first, the lack of knowledge and access to finance of POs and MSMEs needed to become competitive players; and second, the lack of value addition that is undertaken in the country, instead of abroad, needed to ensure higher incomes to rural households and the local economy in general. This subcomponent will use a matching grant mechanism to competitively selected POs and MSMEs to co-finance technically feasible and financially viable business plans. The subcomponent will finance: (i) awareness raising campaigns; (ii) support to POs and MSMEs for the preparation of their business proposals and plans; and (iii) co-financing for competitively selected business plans, including:

- c. **Investments:** equipment (transport, office, ICT tools, storage, product processing, etc.), infrastructure (storage, warehouse, fermentation facilities, etc.), and other related inputs. The investments will need to finally also benefit the producers. For example, a coffee processor may invest in more modern processing equipment, such as hulling machinery and grading and sorting machines, which have the aim to increase the price of the coffee sold, and which could be translated upstream into an increase in income for the producers as well.
- d. **Technical Assistance:** logistics, storage, marketing, agronomy, accounting, financial literacy, food processing, good manufacturing practices, packaging, labelling, traceability, quality control, food safety and hygiene, legal and environmental aspects.

Component 4: Project Management and Monitoring and Evaluation

This activity would support all PCU activities required to manage IDA funds, procure IDA-funded goods and services, conduct project M&E including Iterative Beneficiary Monitoring (IBM), and comply with safeguard mitigation measures. It would provide training and equipment to modernize DAL operations (computer hardware and software, office furniture, vehicles, and so on) at the central level and in the field as needed for project activities. It would also support the development and implementation of a communications strategy, as well as general awareness and sensitization campaigns about project activities.

Component 5: Contingency Emergency Response Component

This component will only be used in the event that an emergency response is required. Experience from the past, and notably the recent earthquake in Southern Highlands, has demonstrated how natural disasters can have devastating impacts on agriculture production and other sectors in PNG. Following an eligible crisis or emergency, the Recipient may request the Association to re-allocate project funds to support response and reconstruction. This component would draw resources from the uncommitted grant resources under the project from other project components to cover emergency response. A CERC Project Operations Manual, acceptable to the Association, for the implementation of the Contingency Emergency Response Plan, will be prepared and constitute a disbursement condition for this sub-component.

A.3 Geographical coverage

The project will be implemented along priority economic corridors as identified under MTDP III and in areas where PPAP has been operating and Project Management Units (PMUs) are well-established. The geographic focus aims to: consolidate PPAP achievements while expanding to new provinces that would benefit from the PPAP delivery model; and converge with GoPNG's priorities for road network enhancement (particularly the Ramu Highway and Gulf Corridor). Targeted provinces are Eastern Highlands, Chimbu, Western Highlands, Enga, Jiwaka, Southern Highlands, Madang, East New Britain (ENB) and the Autonomous Region of Bougainville (AROB) (for consolidation, diversification and stronger focus on quality, markets and producer organisations), and Morobe, New Ireland and West New Britain for Productive Partnership model expansion on cocoa.

PART ONE: BASELINE REPORT

B. COUNTRY PROFILE

Papua New Guinea (PNG) lies to the north of Australia just south of the equator. Apart from the mainland, it consists of a collection of islands, atolls and coral reefs scattered around the coastline. The total area of the country is 462,840 square kilometres.

For administrative purposes, the country is divided four regions:

- Southern Region comprising of the following provinces: Western, Gulf, Central, Milne Bay, Northern Oro, and the National Capital District (NCD).
- Highlands Region comprising of the following provinces: Southern Highlands, Enga, Western Highlands, Chimbu, Eastern Highlands, Hela, and Jiwaka.
- Momase Region comprising of the following provinces: Morobe, Madang, East Sepik, and West Sepik (Sandaun).
- New Guinea Island Region comprising of Manus, New Ireland, East New Britain, West New Britain, and the Autonomous Region of Bougainville.

The National Capital District (NCD) contains the city of Port Moresby, and Momase (Lae city) is the most urbanised area outside of the NCD.



Figure 2 Regions in Papua New Guinea

The terrain is rugged mountainous and has a rich cultural diversity with hundreds of ethnic groups and more than 800 indigenous languages. The different cultural societies and clans are explicitly acknowledged in the nation's constitution, which states a wish for traditional villages and communities to remain as viable units of Papua New Guinean society and for active steps to be taken in their preservation. PNG has abundant natural resources (forest, land, fisheries, minerals) and ecosystems, and hosts a unique range of biodiversity.

History

Papua and New Guinea used to be separate entities, influenced and colonized over 250 years by the Sultanate of Tidore, Holland, Germany, Britain and Japan. In 1885 Germany annexed the northern coast 'New Guinea' and Britain annexed the southern regions 'Papua'. In 1906 Britain transferred the

Territory of Papua to Australia, and in World War I Australia invaded German New Guinea and assumed control under a League of Nations mandate. Under a UN Trusteeship Agreement, Australia took control of both territories in 1945. In 1949 they became one (Radio NZ 2011).

PNG gained independence from Australia in 1975. Strong growth in the mining and resource sector has led to PNG becoming one of the fastest-growing economies in the world.

B.1 System of Government

National

There are four levels of government in PNG - national, provincial, district and local¹. The National Parliament is a 111-member unicameral legislature elected for five-year terms. The Prime Minister is appointed and dismissed by the Governor-General on the proposal of Parliament. The Cabinet – known as the National Executive Council (NEC) – is appointed by the Governor-General on the recommendation of the Prime Minister. The Supreme Court, National Court, and local and village courts form an independent justice system (DFAT 2018).

Key agencies relevant to the PACD include:

- Department of Agriculture and Livestock
- Department of National Planning and Monitoring
- Department of Implementation and Rural Development.

The Department of National Planning and Monitoring (DNPM) acts as the key central agency advising Government on matters relating to strategic development, development policy, development planning and programming, foreign aid coordination, and monitoring and evaluation of national development projects and programmes (DNPM 2016).

The Department of Implementation and Rural Development (DIRD) facilitated and coordinates the Services Improvement Plans (SIPs) for rural development.

Table 1 outlines the service delivery responsibilities for all levels of government. Most public services are provided by the national government with support from the provinces and local level governments (LLGs).

Table 1 Responsibilities for Service Delivery

¹ In AROB, the provincial level government equivalent is Constituency and District equivalent is Community Government.

TRANSPORT	National	Provincial	Urban LLGs	Rural LLGs
Roads	■	■	■	■
Transport	■			
Urban roads	■		■	■
Urban rail	nil			
Ports	■			
Airports	■			
ENVIRONMENT AND PUBLIC SANITATION				
Water and sanitation	■		■	■
Refuse collection and disposal				■
Cemeteries and crematoria				■
Slaughterhouses	■		■	■
Environmental protection	■		■	■
Consumer protection	■		■	■
CULTURE, LEISURE AND SPORTS				
Theatres and concerts	■	■	■	■
Museums and libraries	■	■	■	■
Parks and open spaces	■		■	■
Sports and leisure facilities	■	■	■	■
Religious facilities	■	■	■	■
UTILITIES				
Gas services				
District heating				
Water supply	■		■	■
Electricity	■			
ECONOMIC				
Agriculture, forests and fisheries	■			
Local economic development/promotion	■			
Trade and industry	■			
Tourism	■			

Source: CLGF 2018 (Black squares indicate sole responsibility, whereas blue indicates joint responsibility).

In the Autonomous Region of Bougainville (ARB), the governance system comprises the (i) Legislative, (ii) Executive and (iii) Judiciary. Unique to ARB is 'Community Government', the second level of government under the Bougainville Community Government Act (CG Act) which replaced the Council of Elders (CoE). It comprises District Officers, Traditional Chiefs, Ward Representatives, Ward Steering Committee and other relevant stakeholders to better support community decision-making (ARB 2015).

Provincial

PNG has 22 provinces (Figure 2). Each is governed by a Provincial Administration (PA), headed by a Provincial Administrator. The government system was decentralised through the *Organic Law on Provincial Governments and Local-level Governments 1995* (OLPG&LLG) and the *Local-level Governments Administration Act 1997*.

Development initiatives are implemented through the Provincial Services Improvement Plans (PSIP), District Services Improvement Plans (DSIP) and Local Level Government Improvement Plans (LLSIP). The primary objective of the PSIP, DSIP and LLSIP is to provide minimum service delivery standards through re-establishment of basic infrastructure and facilities including socioeconomic activities of essential services such as health, education, law and justice, quality water and sanitation, transport (sea and land) communication and rural electrification.

As outlined in Table 1 (above), PA's have responsibility to implement the Provincial Services Improvement Plans (PSIPs) and joint delivery of pre-school and elementary schools, roads and cultural and sporting facilities and events.

District

In 2014, Parliament amended the OLPG&LLG and passed the District Development Authority (DDA) Act aimed at enhancing the role of districts in managing public funds at sub-national levels. Under the Act, a DDA was created in each district to control budget allocation priorities and be responsible for service delivery in districts. DDAs are chaired by the open (district) members of parliament (MP), a District Administrator (who functions similarly to the Provincial Administrator) and represented by the head of each LLG in the district.

DDAs are relatively new and their role includes (i) allocating DSIP funds² against priority development needs expressed by LLGs (LLGs Presidents form the DDA), and (ii) coordinate the use of DSIP funds and the districts' service delivery plans with the provincial development plans (as the Chairman of each DDA is represented in the Provincial Executive Council, which determines and controls budget allocation priorities and draws up a rolling five-year development plan for the province). This may include road and infrastructure development and maintenance, district support grants and other grant disbursement, planning and budgeting prioritisation and developing five-year development plans.

No DDA exists in the AROB or NCD.

Local

The Department of Provincial and Local Government Affairs (DPLGA) within the Ministry of Inter-Government Relations has statutory responsibility for all matters relating to local government. Local Level Governments (LLGs) are responsible for water supply and have joint responsibility with provinces for roads, waste disposal, health and environmental protection, economic promotion and tourism. There are 31 urban LLGs and 265 rural LLGs, making a total of 318 local governments (CLGF 2018). LLGs are empowered to enter into public-private partnerships and church partnerships.

The head of the LLG (known as the LLG President) is directly elected by the electorate and the LLG Council comprises Ward Councillors and representatives of church, women and youth. The administrative representative is known as the LLG Manager. LLGs have an average of 19 members, elected for a five-year term based on a ward system. There are approximately 6,186 wards³.

LLGs have full discretion to establish the committees they deem necessary to carry out their functions effectively and efficiently. Each LLG may also have up to three additional members appointed to represent the following interest groups: Trade Union Congress, the Employers' Federation and women's organisations. In rural areas, two women are nominated (CLGF 2018).

Table 2 Local Government by region

Region	Provinces	Urban LLGs	Rural LLGs	Total LLGs	Population (2011 Census)
Southern	6	14	5	19	1,302,887
Highlands	7	6	97	103	3,001,598
Momase	4	5	90	95	1,795,474
Islands	5	6	73	83	959,694
TOTAL	22	31	265	318	7,059,653

Source: CLGF 2018

LLGs are tasked with implementing a LLGSIP and play a key role on the ground in directly communicating with the population at ward and village levels and supporting the provision of service. LLG Councils identify projects and develop proposals for DDAs. The majority of LLGs are under-

² K5 million per District.

³ The number of wards varies between data sources and government agencies.

resourced and/or have limited management and administrative skills, therefore struggle to perform basic administrative functions, though efforts are being made to address this⁴ (Curry et al 2007).

Wards

Each ward has a Ward Development Committee (WDC), led by a chairperson referred to as the Ward Counsellor. The WDC comprises up to five community representatives (two of whom should be women). Despite the close links WDCs have to their communities, many do not function effectively due to funding constraints (Curry et al 2007).

The WDC provides direct reporting from community meetings to the Ward Counsellor and LLG Manager on community matters and ward needs (services, programs, infrastructure), such as identifying projects and submitting proposals, which are fed up to the LLG Manager. The LLG Manager will register the proposals and LLG Council will select and prioritise proposals (for use of DSIP/LLGSIP funds).

⁴ The World Bank's Rural Service Delivery and Local Governance Project in PNG aims to strengthen capacity of wards.

C. ENVIRONMENTAL FACTORS

Papua New Guinea is located within the tropical zone (latitude 0° equator to 12° S and longitude 141° E to 156°30' E). It shares international land boundary with Irian Jaya Province, Indonesia to the west and Australia is to the south. PNG has total land area of 462,842 sq. km and only 27 percent is occupied by people. The land is covered with tropical type vegetations of comprising forests (360,000 sq. km), rivers, 10,940 sq. km, coastline (5,152km), reefs (40,000 sq. km), 5380 lakes, and vast areas of grasslands and savannah woodlands.

C.1 Physical

The country is mostly mountainous with the mainland having a central cordillera and with coastal lowlands and rolling hills (Figure 3). Large rivers flow down from these mountains, the Fly and Purari to the south coast, and the Sepik, Ramu and Markham to the north coast. The highest mountain is Mount Wilhelm of height 4,509 m.

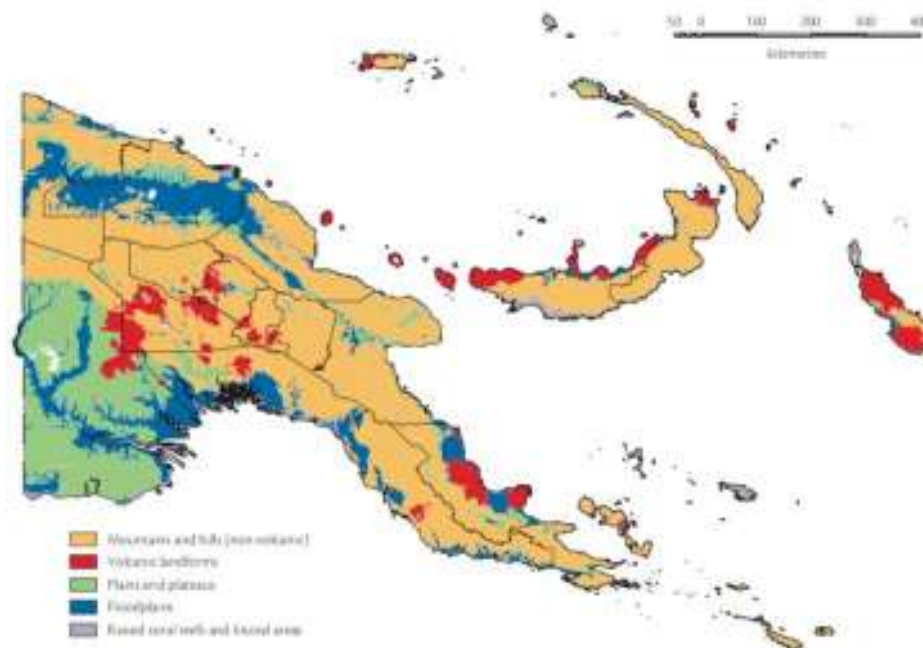


Figure 3 Five landforms in PNG (Bourke & Harwood 2009, p83).

Highlands Provinces

North of Port Moresby lies the Highlands, an east–west-trending zone of mountains with elevations in excess of 4,000 meters and enclosed upland basins whose floors are usually at 1,370 meters or higher. The basins contain lake deposits, formed in the recent geologic past by impeded drainage; soil wash from the surrounding mountains; and layers of volcanic ash, or tephra, deposited from nearby and recently active volcanoes. Such basins, therefore, are usually very fertile. Temperatures are much cooler than in the lowlands, and frosts occasionally cause serious damage to the sweet potato (*kaukau*), which is the staple diet of the area. Much of the natural vegetation of most of the upland basins has been removed by the intensive agricultural technology of the Highlanders. Throughout the Highlands, carefully tended gridiron gardens with their drainage ditches or perfectly circular earth-covered mounds of compost dominate the landscape.

Provinces in the Highlands naturally display cooler climate with Eastern Highlands Province (EHP) having the lowest range of the climates.

Eastern Highlands

The EHP covers 1,000 km including Asaro, Benabena and Dunantina Valleys, all of which are very agriculturally productive with good road access to markets in Goroka and Lae. It is bounded by the rugged Bismark Range in the north, which reaches an elevation of 3500 m on Mt Otto. The south of the province is mountainous and remote with peaks exceeding 3500 m. Most people lived from within the narrow range of 1500-2000 m (NRI 2010).

Western Highlands

The Western Highlands Province (WHP) occupies 900 km sq., with very fertile valleys in the north, northwest and southwest from dormant volcanoes of Mt Hagen and others in close proximity such as Mt Giluwe. There is also the Kubor Range and the Sepik Waghi divide which consists of mountains.

Most people live within the 1400-2200 m altitude range of these areas; the Waghi Valley is densely populated and has a high coffee production small holder and plantation coffee growing. Elevation varies from 600 m to over 4000 m on Mt Wilhelm, Mt Kabangama and Mt Kegeraga. Rainfall ranges from 2,200 to 4,000 mm per annum and this varies from district where the Waghi valley has lower rainfall while the lower Kagul and Jimi valleys have higher rainfall.

Simbu

Simbu Province (also pronounced Chimbu) covers 6,000 km sq. It is bounded by Mt Wilhelm, PNG's highest mountain, in the north to the lowland south of Karimui. This is also a dominant smallholder coffee growing regions in the country and the economy of the province is heavily reliant on coffee. Altitude ranges from 300 m on the southern border of the Gulf Province to over 4500 m on the summit of Mt Wilhelm. Most people reside within the 1400 – 2000 m altitude range. Average annual rainfall ranges from 2200 – 4000 mm and it increases from the north to south.

Enga

Enga Province covers 11,704 km sq. in the mountainous western highlands and shares a northern border with East Sepik Province. The Central Range runs through the north of the province, with two river valleys, the Lagaip and the Lai supporting high population densities. The Lagaip River runs south to join the Fly River while the Lai joins the Sepik River in the north.

Agriculture provides only a low to moderate source of income for the province, earned from the sale of coffee, food and firewood. Cultivated areas are very prone to both drought and frost, which can seriously affect food security. Some royalties and wage employment can be earned at the Porgera Goldmine (NRI 2010).

Jiwaka

Jiwaka Province was previously part of the WHP (disbanded in 2012). The province covers 4,798 km sq. and in the very fertile Waghi Valley adjoining the Waghi River.

The province is bordered by the Bismarck Range to the north, which forms part of the highest mountain peak in PNG in Simbu Province. The Bismarck Range acts as the natural boundary for Jimi district, with Simbu to the east of Jiwaka and Madang Province to the north. This part of the province is relatively mountains and very sparsely populated with minimal infrastructure development. The southern part of Jiwaka, Kambia, is naturally bordered by Kubor Range, which is part of the central backbone mountain range of PNG (Author Unknown 2015).

Southern Highlands

Southern Highlands Province is 25,587 km sq. and covers the Central Range and Lagaip Valley in the north. The Tagari Valley runs through the centre. The south of the province includes limestone plateaux, Lake Kutubu and the Hegigio, Mubi and Digimu Valleys as well as the dormant volcano, Mt. Bosavi. Coffee production is the main agricultural activity for cash with 43.6% of households engaged in the coffee sector (NRI 2010).

Much of the terrain is very rugged, and human occupation limited to isolated pockets. Rivers are not navigable, and the road system is limited to the northern, less rugged part of the province (Author Unknown 2015).

Coastal Provinces

Madang

Madang province occupies 28,000 km sq. in the central north of the PNG mainland. It has a diverse range of environments from having a border with Mt Wilhelm, the highest peak in PNG, to the coast. Mountain ranges of Adelbert, Finisterre and Bismarck, together with extensive Ramu River floodplains, coastal limestone plains together with volcanic islands offshore make up the landscape.

Three of these volcanoes are active and are a serious hazard to the people of Madang. Bismarck Fall has a vertical drop of 4300m from the summit of Mt Wilhelm to the Ramu Valley, over a distance of

45kms. Altitude ranges from the sea level to over 4,000 m on the slopes of Mt Wilhelm. Annual rainfall varies from 2000mm around Bogia to more than 4,000 mm in the Ramu valley and Bismarck Fall. Both cocoa and coffee are grown in Madang with cocoa being dominant together with copra from coconut.

East New Britain

East New Britain Province (ENB) covers approximately 15,100 km sq. of the island of New Britain. Altitude ranges from sea level to over 2,000 m at Mt Ulawun, Mt Bamus and Mt Berurumea. The Gazelle Peninsula is in the north of the province and encompasses the Baining Mountain, valleys of Keravat and Warongoi, and numerous smaller rivers and nature coastal plains. In the North East of the Gazelle Peninsula are fertile hills and plains that surround the Rabaul volcanoes.

The islands of Wartom and Duke of York make up the larger of the islands to the northwest and east of Rabaul respectively. In the south, the Nakanai Mountains of extensive limestone plateaus dominate, with narrow coastal plains and the active volcanic peaks of Mt Ulawun and Mt. Bamus. With the province built upon successive layers of ash, agriculture is extensive and small holder cocoa farmers thrive. Agriculture is practiced up to 1,200 m on the Mamusi Plateau in the Baining Mountains. The average annual rainfall varies from 2,000 mm near Kokopo to over 5,000 mm on the south coast.

Autonomous Region of Bougainville

The Autonomous Region of Bougainville is comprised of two islands – Bougainville Island and Buka Island, as well as smaller atolls and islands. It covers approximately 9,384 km sq. and is dominated by the volcanic peaks Mt Bagan in the Crown Prince Range in the south and the Emperor Range with its highest peak at Mt Balbi (2,743 meters) in the north. Altitude varies from coastal areas to over 2,700 m. The coastal areas include raised coral limestone plains, volcanic plains and fans, valleys, flood plains and swamps. Most of the coastal areas have fertile volcanic soils that have been used intensively for plantation and small holder cocoa and coconut production. Buka Island is a raised coral limestone plain bordered by the hills of the Parkinson Range in the south west. Average annual rainfall varies from 2,500 mm around Tinputz, to over 4,000 m around Buin in the south.

C.2 Biodiversity

PNG's rich ecosystems contain considerable biodiversity due to different localized environments, climates, isolation (island from island, mainland from Asia), where new species have evolved over the centuries (Figure 4). The biological compositions and distribution in PNG are greatly affected by varying rainfalls, temperature differences, altitude, soil, geological and history of natural disturbances. The terrestrial and aquatic, marine and coastal flora and fauna is diverse and pristine with comparable capacity or value to other parts of the world.

PNG's is a home to about 5 percent of the plants and animals known to exist on earth with an estimated:

- 21,000 types of higher order plants
- 300 kinds of fish
- 762 species of birds,
- 50,000 plus different kinds of insects, and
- 242 species of mammals.

The country possesses a rich variety of reptiles, marsupials, native freshwater fish, and birds but is almost devoid of large mammals.



Figure 4 Ecoregions of Papua New Guinea (Source: WWF 2017).

Forests

Forests cover 70 percent of the PNG's total land and it is one of world's largest remaining forest areas. PNG has more than 1,200 different kinds of trees growing in the lowland forests alone, while another 300 kinds occur in other forest areas. Forest types include:

- Lowland Alluvial Plain Forest
- Foothill Forest (below 1000m)
- Lower Montane Forest (1000-3000m)
- Upper Montane Forest (3000-3900m)

Major commercial logging operations exist around Madang, New Britain and New Ireland islands, which account for 10 percent of exports.

Appendix 1 contains the protected areas and threatened species.

C.3 Climatic

Papua New Guinea climate is tropical and is generally hot and humid but varies dramatically throughout the country. Typically, there is a northwest monsoon (December to March), with a southeast monsoon (May to October) and slight seasonal temperature variation. Annual rainfall varies from over 8,000 mm in the Star Mountains of Western Province to only about 1,150 mm in Port Moresby. Temperature generally remains between 20°C and 32.5°C but can get to as low as 5°C to 0°C in the Highlands. The temperature in Port Moresby rarely rises above 32°C.

Figure 5 below shows temperature increases for Kavieng, New Ireland, Madang and Port Moresby over the last 50 years (Bourke & Harwood 2009 p77).



Figure 5 Temperature increases in PNG

Climate drivers are the El Niño Southern Oscillation (ENSO) and, to a lesser extent, the position of the South Pacific Convergence Zone. ENSO is considered to have a weaker influence on the northern part of the country (ADB 2017). Climate predictions for PNG include:

- Continuation of El Niño and La Niña events with uncertainty about whether these will be more or less frequent, or more or less intensive although some studies state that drought conditions are more likely.
- Annual mean temperatures are projected to continue to rise across PNG by 1.1°C by 2030, and a further rise of 0.4 – 4.2°C by 2090⁵.
- Extreme temperatures are also projected to continue to rise, by approximately the same amount as the annual mean temperatures. Further, the frequency of extremely hot days is projected to increase.
- Increase in the long-term average rainfall in most areas of PNG. By 2050, annual rainfall is projected to increase by approximately 6% to 8% (depending on modelling) and will be more concentrated into the rainy seasons.
- Increase in the maximum intensity of rainfall. By 2030, the current 1-in-20-year daily rainfall amount is projected to increase by 12-14 mm; and by 2090, it is projected to increase by 21-55 mm. By 2090, the current 1-in-20-year daily rainfall event will become, on average, a 1-in-7 year or even a 1-in-4-year event.

Climatic changes are likely to adversely impact subsistence farming, agricultural production, food and water security around the country over the coming decades.

Natural Hazards

The country's vulnerability to climate risks and hazards is due to climate variability and complex geography:

- PNG lies between two major lithospheric plates, the Pacific Plate to the northeast and the Indo-Australia Plate to the south and southwest, where plate collisions generate seismic activity.
- PNG has two major climatic seasons (wet and dry), prevailing for six months each annually but subject to both El Niño and La Niña events.

PNG is ranked 10th in the world due to the country's high exposure to natural disasters and its high social and economic vulnerability to these events⁶ (World Bank 2019). The country experiences geological and climatic disasters including flooding, tsunamis, cyclones, volcanoes, landslides,

⁵ Relative to 1995 temperatures and depending on scenarios and models used.

⁶ El Niño + UNU-EHS, 2016. World Risk Report 2016.

earthquakes, drought and bushfires during dry season (associated with El Niño events). The volcanoes and earthquakes are common in the New Guinea Island Region, while flooding threatens lowlands areas especially during wet seasons. The landslides are usually associated with extreme rainfalls in the mountainous areas, especially during wet season, while bushfires are common during dry season.

Figure 6 illustrate risk areas for seismic activity, tropical cyclones and volcanic activity.

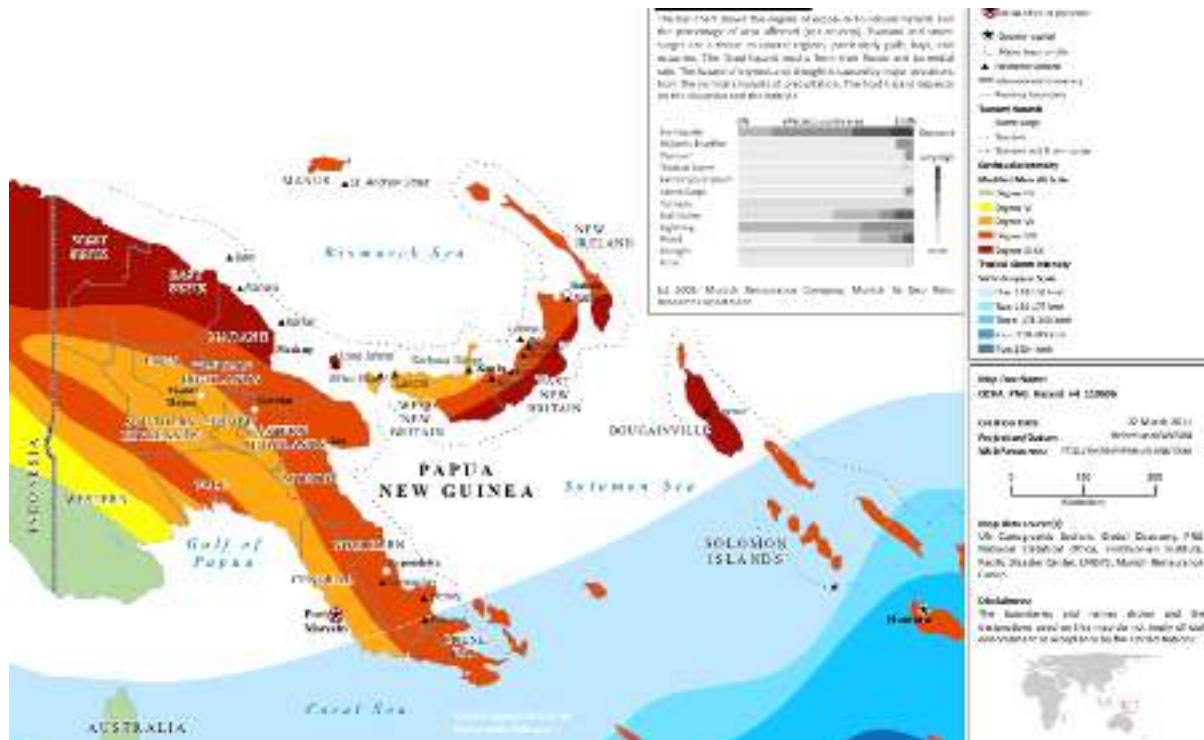


Figure 6 Hazard risk areas in Papua New Guinea (OCHA 2011)

Between 1997-2010, four million people in the country were affected by natural disasters with damages estimated at around US\$100 million. The PNG National Disaster Centre estimated that the 2015-16 El Niño event affected some 2.4 million people with both drought and frost adversely impacting agriculture, health and food security. In 2015, the drought led to food shortages with the majority of those affected in the Highlands Region. In February 2018, a 7.5 magnitude earthquake affected 544,368 people across five provinces of Hela, SHP, Enga, Western and Gulf. In SHP and Hela provinces alone, it is estimated to have killed over 100 people, displaced 18,200 and left 270,442 people in need of immediate humanitarian assistance (World Bank 2019).

Effect of disaster events on livelihoods

PNG's food security status is very low and primarily dependent on subsistence fresh garden produce in rural areas. Brun (2018) reported the impact of the aforementioned disaster events in 2015 and 2018 on rural households:

Households dependent on such agricultural activities as their main source of income are vulnerable to being severely food insecure. Dependency of much of the population on garden-crop agriculture, combined with the consecutive disasters that have eroded families' capacities to recover, limit their ability to cope.

Caring responsibilities for children and ill family members increased burden on many women during this period, and combine with disaster-induced displacement, many food gardens were abandoned and/or destroyed. This had the following flow-on effects:

- Women did not have surpluses to sell, diminishing their (already minimal) incomes.

consolidate Papua New Guinea's position as a supplier of fine flavour premium cocoa. (CABI date unknown).

Value Chain

In the cocoa sector, 72 percent and 36 percent of households were recorded as selling wet and dry bean respectively. In ENB, cocoa was sold primarily to traders in ARB (88%) and to clan members (50%), traders (36%) and exporters (13%) [UniQuest 2013].

Many growers sell wet beans to intermediaries or to fermentaries, where the added value is performed (fermentaries). Growers who sell wet beans, which require 160 kilograms to produce one 63.5 kilogram bag of dried beans, are only receiving about 20-25 percent of the world price of cocoa beans. After fermentation, the dried beans are sold to collectors for export buyers, or to the exporters directly at about 80-85 percent of the FOB world price of cocoa beans.

Production areas

Key cocoa production areas include East New Britain, ARB, East Sepik and Madang. It is the most significant form of income for the ARB and East New Britain with the percentage of household engagement of cocoa production for cash at 69.5 percent and 58.2 percent respectively (NRI 2010).

Environmental practices

Fermentaries and dryers are small-scale for family or cooperative and interplanted with other crops. New plantings are in old cocoa gardens. Pesticide is not used by many farmers due to cost.

Fertiliser accounted for approximately 6 percent of the total cost of inputs, with only households in Inland Baining and Bitapaka applying it to their crops (UniQuest 2013). On average, the cost of inputs by households into their agricultural production was K166 in ENB and K73 in ARB, with the combined cost of herbicides and pesticides accounting for approximately 76 percent.

Coffee Sector

Coffee is a major export commodity for Papua New Guinea, earning between PGK300 million and 1 billion per year. Roughly, one-third of Papua New Guinea's labour force is involved in its production, processing and sale. Although coffee provides the highest potential for growth and gains within the agriculture sector productivity is low, with coffee yields averaging 30–50 per cent of their potential. Coffee quality is deteriorating due to ageing plants, poor coffee husbandry practices, limited support services, and poor access to markets. The economic potential of the coffee sector is poorly understood by smallholder farmers. Provision of services including extension, training, capacity building, and finance is limited and poorly targeted (CARE 2017).

Value Chain

At the grower level, there are three sorts of producers:

- (i) smallholders representing 85% of production;
- (ii) blockholders representing 5% of production (ranging from 5 to 29 ha); and
- (iii) plantations representing 10% of production (>30 ha with an average size of 50 ha).

In 2008, there were 397,772 coffee growing households (2.5 million people), around 60 plantations, over 250 blocks, 47 wet factories, 57 dry factories, 15 exporters and five roasters (CIC 2018).



Figure 8 *Transporting coffee in Highlands*

Smallholders

A typical smallholder garden will produce around 700-1000 kg of coffee from a garden of around one hectare. Most will produce cherry to parchment using simple hand pulpers and sun drying. The parchment is then sold to roadside buyers or directly to the factory.

Methods to receive updates on coffee market price included word-of-mouth (36.9%), noticeboard (35.1%), meetings (10-11%) amongst others (Coulombe 2018b).

Blockholders

The “20 ha block” scheme was started in the late 1970’s using finance from the World Bank and largely administered by the then Agriculture Bank. There are over 250 blocks and they account for around 5% of production.

Plantations

There are around 15,000 ha of plantation coffee with the typical size of each plantation is 50ha. Most companies are formed around several plantations; the average size of plantation group is around 300ha.

Production areas

Coffee production is the backbone of the rural economy in the Highlands, with approximately 90 percent of national exports originating in WHP, Jiwaka, EHP and Simbu Provinces. The majority of coffee (88 percent) is produced by an estimated 370,000 smallholder producers nationwide. Productivity is low, with yields on average 30-50 percent of their potential. The production trend for the last decade indicates a clear decline and despite its socio-economic importance, PNG coffee has undergone an overall deterioration in productivity and quality (Coulombe 2018b).

Environmental practices

The PPAP Baseline Study (2013) recorded that <0.5% households used fungicides for disease control, <1% used insecticides for pest control but that most households used herbicides for weed control. There was a high prevalence in Jiwaka and WHP and the most common herbicide was glyphosate (Round-Up) followed by Paraquat (toxic).

UniQuest (2013, p43) recorded that only 2% of farming households using spray equipment had a designated location for cleaning spray equipment and the majority either cleaned it in the river or close to a water source. In addition, chemical containers were discarded in the bush, gully or stream or reused for chemical containers for household use; and 24% of households burned or buried the containers. The majority of households disposed of chemical containers by throwing them into the bush, a gully, or a stream. Only 24% of households burned or buried containers. Of some concern is the reuse of chemical containers for household use, including as containers for drinking water.

Coconut Sector

Value Chain

Coconut products include copra, coconut oil, coconut meal, desiccated coconut, coconut milk, coconut charcoal, activated coconut carbon, coconut lumber, coconut coir and coir pith. Products exported from Papua New Guinea include copra, crude copra oil (CNO) and copra meal, with key markets in Philippines, Singapore, Malaysia and Bangladesh.

There are 14 small-medium enterprises in the country, with five certified to meet international food safety standards through Hazard Analysis and Critical Control Point (HACCP) certification⁸.

Production areas

⁸ Hazard Analysis and Critical Control Point (HACCP) is a systematic approach in identifying, evaluating and controlling food safety hazards. Food safety hazards are biological, chemical or physical agents that are reasonably likely to cause illness or injury in the absence of their control. A HACCP system is a preventive system of hazard control rather than a reactive one. HACCP systems are designed to prevent the occurrence of potential food safety problems. This is achieved by assessing the inherent hazards attributable to a product or a process, determining the necessary steps that will control the identified hazards, and implementing active managerial control practices to ensure that the hazards are eliminated or minimized.

The Coconut Industry Strategic Plan 2016-2025 stated copra production has fluctuated between 60,000 and 146,500 tonnes over the last decade, with a sharp decline in 2013 (KIK 2016). The provinces actively producing copra are:

- East New Britain (38.7%)
- Madang (25%)
- ARB (22.1%)
- West New Britain (8.5%)
- Milne Bay (3.2%) and
- New Ireland (2.6%).

Environmental practices

The coconut sector is environmentally friendly with little to no environmental impact. Inputs such as pesticide, fertilizer and fungicide are not required and local tol variety of coconut trees is preferred due to long lifespan.

Livestock Sector

The livestock sector is dominated by pig rearing at the subsistence level. PNG has limited cattle ranching concentrated mostly in the Markham and Ramu Valleys in Morobe and Madang provinces, respectively. Other commercial livestock include piggyery, chicken and fish farming (aquaculture), which are being undertaken at small scales where urban markets exist.

Pigs

The pig industry comprises the following characteristics:

- Traditional smallholder (1-20 pigs)
- Penned smallholder (1-3 pigs)
- Commercial smallholder (10-100 pigs)
- Commercial medium scale (100-500 pigs)
- Commercial large-scale (>500 pigs).

The majority of the industry is 'traditional smallholder' (98%) with a total of 1.8 million pigs in villages, half of which were sold or slaughtered, with an additional 32,000 pigs in the commercial sector in 2005 (Bourke & Harwood 2009).

According to Bourke and Harwood (2009), there are many more pigs per person in the Highlands (above 1200 m altitude) than in the lowlands (sea level to 600 m altitude), with more than one pig per person in the Highlands (Table 3). The ratio of pigs to persons is also higher in the intermediate altitude class (600–1200 m) than in the lowlands.

Commercial pigs are slaughtered in four registered abattoirs. Of the 29,600 pigs slaughtered in 2005, the Lae abattoir accounted for 45% and Abunaka, a private pig farm near Lae, 38%.

Table 3 Average number of pigs per person

Altitude class	Ratio of pigs to people	Number of observations
Lowlands (sea level to 600 m)	0.3:1	37
Intermediate (600–1200 m)	0.5:1	33
Highlands (1200–2800 m)	1.2:1	94

In parts of the Highlands, pigs are sold as meat to raise cash to buy imported rice and flour. Pigs and pig meat are significant in customary exchanges in parts of the Highlands. In the Tari basin (SHP), the sale of pork or live pigs is the single most important income source. The price of large animals is often very high, particularly in the highlands, where a large pig may fetch more than K1000. Sale of pig meat is a common response to the need for cash. For example, during the 1997 drought and associated food shortages villagers.

Poultry

Commercial poultry production only began in the 1970s, fostered by deliberate government policy and protection from imports. Domestic production has grown from around 4000 tonnes in 1980 to 24,000 tonnes in 2005. A feature of commercial production is the large number of smallholder farmers, perhaps up to 15,000, who purchase day-old hybrid broiler chicks in lots of 50 or 100 from one of the three hatcheries and sell them when grown, mainly as live birds in local markets.

There are four main components to the poultry sector in PNG:

- Commercial broilers
- Broilers (live sales)
- Commercial layers (eggs)
- Village

Total production of day-old broiler chicks from three major hatcheries in the country was about 400,000 per week in 2009 (Bourke & Harwood 2009).



Figure 9 Chicken broiler processing facility (Tablebirds) near Lae (Strydom 2014)

Spices & Apiculture Sector

Spices

A number of crops that yield spices or flavourings are grown in PNG and have potential as export cash crops. Vanilla has been the most significant in recent years, followed by chilli and cardamom. Other spice export crops are annatto (bixa), black pepper, cinnamon, citronella, ginger, nutmeg, mint, lemongrass, patchouli and turmeric (Bourke & Harwood 2009).

Key areas of smallholder activity include East New Britain, Madang, East Sepik, Simbu, WHP, Oro, Southern Highlands, Central and Milne Bay. Pacific Spices are the main buyer and exporter and the Spices Industry Board (SIB) has faced difficulty in developing and providing support to the sector.

Apiculture

Honey is a small industry in PNG, first established in the EHP in the 1970s which is where most of the production is still concentrated today. CIC (2016) estimates that half of the 1,000 beekeepers are located in EHP. Hived honeybee (*Apis mellifera*) colonies yield 50 tonnes of honey per annum (PGK1.2 million) with 200 tonnes consumed domestically.

Bees are most productive at 1,500-2,000m in altitude and efforts are being made to supplement coffee farmer income and increase coffee production with apiculture in the Highlands (CIC 2016).

New Guinea Fruit Company is the principal buyer, processor and marketer of honey (Bourke & Harwood 2009). There are also producers in East Sepik, Bougainville and throughout the Highlands region. Antibiotics, miticides, pesticides and fumigants are not used meaning it can be marketed as organic, although the varroa mite had affected hives in East Sepik.

The Eastern Highlands Bee Farmers Association provides representation between government and the private sector. The honey industry has significant potential to provide smallholder farmers with sustainable income and diversify the agriculture sector. It has been reported that the potential revenue from honey production could outweigh that of the local coffee industry if adequate support and funding was provided. The local demand for honey is high and producers are struggling to keep up with demand. Local supermarkets in Goroka are paying K21 for 595g of honey (EMTV News 2016).

Pest Management

Recently the EHP beekeepers have been significantly affected by the tropilaeaps mite which has devastated up to half of their beehives (ABC Radio 2017).

Chemical use in agriculture

Village production of food and export crops uses negligible amounts of herbicides, insecticides or fungicides. Most rural villagers engaged in agriculture in PNG do not use inorganic (manufactured) fertiliser but herbicides are more common.

The cocoa industry uses almost no chemicals. The most common herbicide is glyphosate (55%) and gramoxone (20%). Other herbicides and surfactants make up the remainder. Small quantities of insecticide are used to control green scale and coffee borer in coffee and fungicide is used for the control of coffee rust in the Highlands (Bourke & Harwood 2009).

Table 4 details usage rates for fertiliser, herbicide, insecticide and fungicide across different crop types.

Table 4 *Estimated chemical use in 2002*

Crop	Fertiliser (tonnes)	Herbicide (litres)	Insecticide (litres)	Fungicide (litres)
Oil palm	14,500	396,000	5,000	0
Sugar cane	500	80,000	1,000	0
Coffee	800	70,000	0	2,000
Vegetables	700	0	4,000	0
Cocoa	300	0	1,000	0
Irish potato	700	0	0	0
Total	17,500	546,000	11,000	2,000

Source: Steve Woodhouse, Farmset Limited, Rabaul.

Incidences of agricultural chemical injuries were relatively uncommon, with only 3% of households surveyed for PPAP reporting occurrences (UniQuest 2013). In most cases, these incidences were caused from spray drift affecting eyes, or chemical burns to legs and arms from mixing and application.

Of all households using agricultural chemicals, 68% reported banning some household members from working with these chemicals. The most commonly banned group were household members under 18 years of age, although persons untrained in chemical use (71%) and pregnant women (58%) were also commonly banned. A small number of households employed outside labour to apply chemicals rather than undertaking this task themselves.

Households aligned with coffee certification schemes were more likely to have received training on chemical handling than other households, with 55% having training in coffee production and processing in 2011, compared with only 13% of other households surveyed.

Environmental risk management in terms of biocide (pesticide, herbicide, fungicide) management practices for both issues of contamination and health; soil husbandry practices; biodiversity changes (including any impacts on forests, waterways and/or natural habitats); farm waste management. Very few farmers use chemical products.

D. SOCIO-ECONOMIC FACTORS

D.1 Ethnic and Linguistic Diversity

Papua New Guinea's ethnic groups are sometimes generally named according to geographic regions. These ethnic geographical identities in Papua New Guinea include:

- Highlanders (Highlands region)
- Coastal or Papuans (Southern Region)
- Tolais (Islands Region)
- Bukas (Island Region)
- Niugini Islanders (Islands Region)
- Sepiks (Momase Region)
- Madangs (Momase Region)
- Morobeans (Momase Region)

Figure 10 highlights different ethnic groups throughout the country.

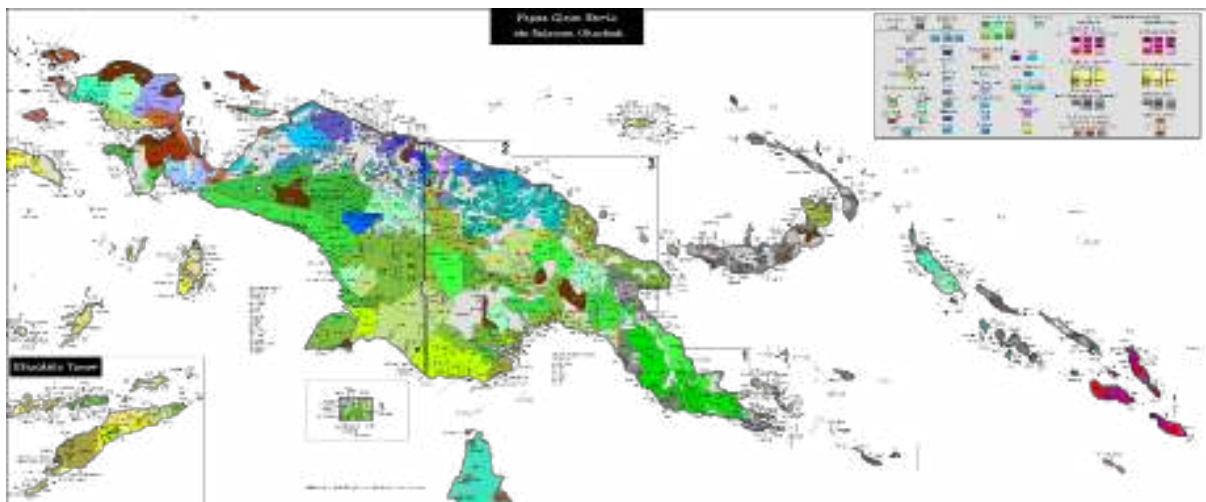


Figure 10 Ethnic Diversity in Papua New Guinea (Bandem 2018)

There are approximately 550 non-Austronesian languages have small speech communities, the largest being the Enga in the Wabag area (Figure 11). Tok Pisin and Motu have developed as an effective lingua franca. Tok Pisin is mostly used as a business language in the Highlands, Momase, and Islands regions while Motu (Police Motu) is a common and effective business language in the Papuan region.

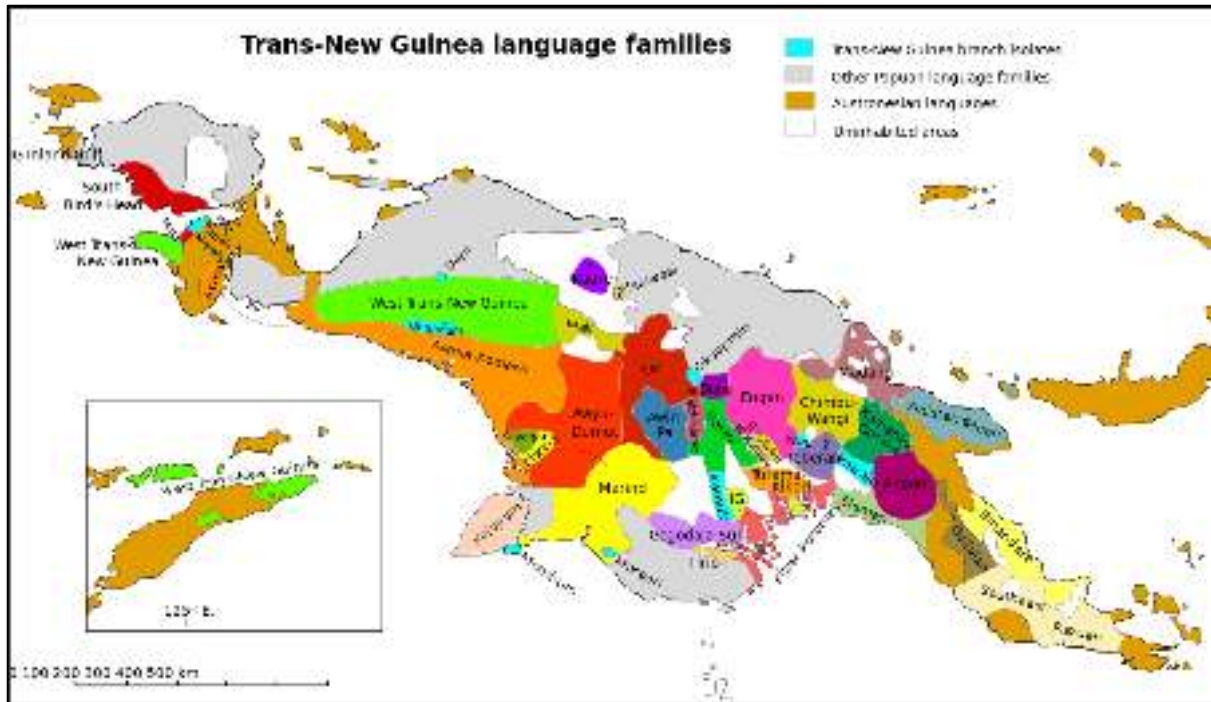


Figure 11 Language groups in West Papua and Papua New Guinea (Bandem 2018).

Development Status

PNG's Human Development Index (HDI)⁹ ranking was 155 in 2010 and improved slightly to 153 in 2015, out of 189 countries and territories². Between 1990 and 2017, Papua New Guinea's life expectancy at birth increased by 6.8 years, mean years of schooling increased by 2.3 years and expected years of schooling increased by 5.3 years (UNDP 2018).

Table 5 Key Development Indicators

Development indices	Measure	Year	Source
Human Development Index	0.544	2018	UNDP 2018
Life expectancy (M/F)	65.7	2018	UNDP 2018
Infant mortality (under 5yrs)	53 per 1000 live births	2017	World Bank 2017c
Maternal mortality	250 per 100,000 live births	2006	PNG Demographic & Health Survey
Population living below poverty line	>38%	2010	World Bank 2017c

Urban and rural disparity

Over 80 percent live in rural areas with heavy reliance upon subsistence agriculture and the remainder reside in small urban centers with populations. The disparity between rural and urban living conditions is exacerbated by the country's difficult terrain which increases hardship, poverty, and isolation in rural areas, and limits access to basic services, infrastructure and economic markets.

In the last 18 years, mobile phone subscriptions have gone from zero to 46.8 percent of the population.

Economy

The country is dominated by two main sectors: the formal, capital-intensive mining and energy sector which relies heavily on the country's rich natural resources and accounts for most of the export earnings,

⁹ UNDP Human Development Indices and Indicators: 2018 Statistical Update

and the agriculture sector which, while largely informal, employs an estimated 80 percent of the population and accounts for approximately 27 percent of GDP.

D.2 Demographics

In 2017, PNG's population was estimated to be approximately 8.25 million. The population growth rate in PNG has slowed from 2.5% in 1990 to 2% in 2017, although population density has increased from 9.5% to 18.2% nationally during the same period (WHO 2018).

The 2009-10 Household Income and Expenditure Survey (HIES) recorded that 51.5% of the population are 19 years or younger (Table 6). This is slightly more prevalent in rural areas (51.9%) than urban (48.3%).

Table 6 *Percentage of population by region, rural and urban areas, age and gender*

Age (years)	National	Rural	Urban	Metro	Southern	Highlands	Momase	Islands
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0-5	13.9	14.1	12.2	12.0	14.8	12.7	15.3	14.1
5-9	13.7	14.0	11.8	11.1	13.7	13.4	14.7	13.7
10-14	13.4	13.5	12.7	11.5	13.4	12.9	14.0	14.1
15-19	10.5	10.3	11.6	11.7	9.3	10.6	10.5	10.7
20-24	7.9	7.5	10.1	10.7	8.0	7.1	7.8	8.6
25-29	8.0	7.9	8.6	9.3	7.6	8.8	7.1	7.3
30-34	6.7	6.7	7.3	7.1	7.0	6.6	6.7	6.7
35-39	6.3	6.2	6.9	7.8	7.7	6.2	5.8	5.5
40-44	4.5	4.5	4.9	5.6	4.1	4.7	4.6	4.0
45-49	4.7	4.7	4.8	4.7	4.8	5.1	4.0	5.2
50-54	3.5	3.4	3.7	3.7	2.9	3.8	3.2	3.5
55-59	2.5	2.6	2.5	2.3	2.5	2.6	2.4	2.7
60-64	1.6	1.7	1.5	1.2	1.4	1.9	1.6	1.4
65+	2.9	3.2	1.4	1.4	2.8	3.8	2.4	2.6

Source: National Statistics Office 2011.

Provincial data

Appendix 2 provides detailed information on provincial-level statistics sources from the National Census in 2011.

Highlands Provinces

About 39% of the population live in the Highlands region. Its population primarily lives in remote and rural communities, with 37.5% of the people living below the poverty line (CARE 2018).

All districts (with the exception of Kainantu district) had high participation rates in coffee sector (95%+) [NRI 2010]. Enga has the lowest female literary rate of all provinces with Karimui Nomane and Chuave districts recorded as 14.4 percent and 26 percent respectively. It also had the lowest level of school completion in PNG. Tari Port District had greater literacy rate for females (45.4%) and greater engagement in coffee, poultry and livestock for cash.

Coastal Provinces

The Coastal Provinces are predominantly engaged in cocoa and coconut as the main cash crop. The Province of Bougainville producing the highest percentage of cocoa with 69.5% of households engaged in cocoa for cash and a high literacy rate in females at 75%. South Bougainville had the highest number of households engaged in cocoa and livestock production for cash at 78.6% and 34.3% respectively.

East New Britain has the highest female literacy rate of 80.7%. At the District level the highest literacy rate for women is 95.2% in Rabaul. Gazelle District produces the most cocoa in this Province with 76.1% of households engaged in production for cash and a high female literacy rate of 85.4%. The lowest literacy rate for women was 16.6% in the Province of Madang and District of Middle Ramu where they had the highest household engagement in coffee for cash (44.4%) in the Coastal Region. (NRI, 2010).

D.3 Governance

Ward and Village Governance

The Ward Counsellor and Ward Recorder play an important role for village clusters in managing the affairs, and meeting the needs of, their constituents. Ward-level governance is outlined in Section B.1.5.

At the village level, traditional chiefs play a central role in community decision-making. Church, community-based organisations (CBOs) and non-government organisations (NGOs) provide local services such as education and health and supporting the interested of particular groups such as youth and women.

In rural areas, churches may be the only organisations providing services for people. Involvement in church provides women with an avenue to participate in civil society and access resources and skills they may need to address economic and social needs of women and their families (such as household budgeting and leadership skills). There are often also other informal community groups that mobilise to meet an identified need (but may lay dormant until need catalyses them into action) [Curry et al 2007].

Common constraints amongst these groups are:

- Insufficient capacity to undertake project tasks due to lack of skilled persons, education and/or skills in budgeting, bookkeeping, record keeping and project management.
- Leveraging group assets for personal use (e.g. vehicles).
- Comprehension of project objectives.

Engagement at the local level is paramount for the success of any project, and capacity building and resources need to take into account the local reality.

Autonomous Region of Bougainville

In ARB, one woman and one man is elected from each ward to represent them at Community Government. The system respects local customary authority by supporting traditional leaders, village court, land mediators and Community Auxiliary Police and works closely with local groups to design and plan government service delivery and community development in coordination with District Managers.

D.4 Health, water, sanitation and nutrition

Health Status

Child health

Both infant and under-5 mortality have decreased steadily since 1990, but not sufficiently for PNG to meet its Millennium Development Goal 4 which calls for reductions by 2015 in under-5 mortality from 90 (in 2000) to 32 per 1000 live births, and in infant mortality from 64 (in 2000) to 24 per 1000 live births. One in every 13 children born in PNG dies before the age of five. Preventable and treatable diseases, including malaria, pneumonia, diarrhoea, tuberculosis, HIV, and neonatal sepsis are the most frequent causes of childhood deaths (Figure 12).

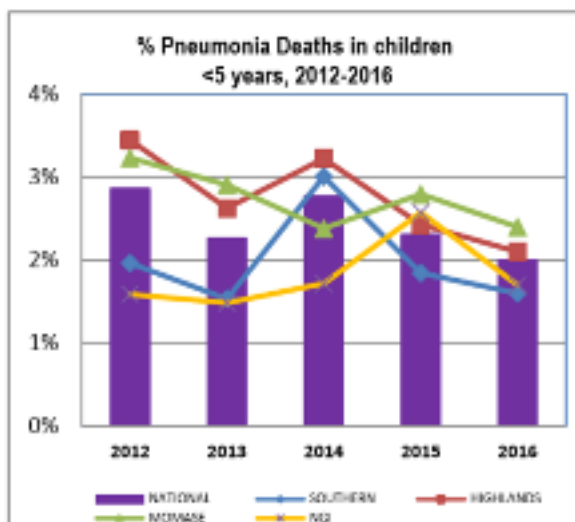


Figure 12 Child pneumonia death 2012-2016 (GoPNG 2017).

The Highlands Region has the second highest rate of pneumonia deaths in children at 2.10% with Jiwaka having the highest rate amongst the Highlands Region Provinces at 3.9% followed by Enga at 3.10%. The highest rates of Malaria between 2012-2016 were predominantly in the New Guinea Island Region with Milne Bay Province recording the highest rates in 2016 (GoPNG 2017).

PNG has the fourth highest child stunting rate in the world. An estimated 28 percent of children are underweight, and 5-15 percent are wasted. The Highlands region has the highest rates of stunting at 61.5 percent, and the island region has the highest wasting and underweight rates at 19 percent and 29.2 percent respectively (UNDP 2018).

Adult Health

Life expectancy is shorter and infant mortality is higher than most neighbouring Pacific countries. The leading health problems are communicable diseases, with malaria, tuberculosis, diarrhoeal diseases, and acute respiratory disease as major causes of morbidity and mortality.

PNG ranks second highest in the world for maternal mortality outside of Sub-Saharan Africa. Maternal mortality is a serious problem in PNG, 53% of births are attended by skilled health personnel.

Acute respiratory infections (ARI), in particular pneumonia, is the leading cause of hospitalisation, and besides neonatal conditions the leading cause of deaths in health facilities. Malaria is the second most common cause of admission to hospital (GoPNG 2010). Tuberculosis is also a major concern consuming 13% of hospital bed days – more than any other disease or health concern besides obstetric cases.

PNG has a generalized HIV epidemic, driven predominantly by heterosexual transmission. HIV has increased significantly since the late 1990's and since 2005, up to 60% of new diagnosis have affected women. HIV-related illnesses are now also the most common cause of child mortality (GoPNG 2010). Although there has been a 5% increase in new HIV/AIDS infections since 2010, there has been a 28% decline in AIDS-related deaths during the same period (UNAIDS 2018).

Diarrhoea and cholera are common with diarrhoea one of the leading reasons for both inpatient and outpatient visits to health facilities, an indication of poor sanitation and access to clean water (GoPNG, 2010).

Access to health services

PNG has low numbers of health professionals per head of population: 5.3 nurses/midwives and less than 1 doctor per 10,000 people. Community health workers comprise almost 35% and nursing officers about 30% of the total health workforce, while medical officers and health extension officers (intermediate level workers bridging the gap between doctors and nurses) together comprise less than 8%.

According to the Ministry of Health, there were 1820 aid posts, 508 larger health centres, and 48 urban clinics in 2000. About 96 percent of the people living within reach of these primary health care centres.

Table 7 Health Facilities in Papua New Guinea (2010)

	Govt	Mission	Other	Total
Provincial hospitals	20	2	-	22
Urban clinics	48	10	11	69
District and rural hospitals	5	7	2	14
Health centres [^]	149	48	4	201
Health sub-centres	158	263	7	428
Aid post (open)*	2,672	-	-	2,672
Aid post (closed)*	776	-	-	776
Total	3,828	330	24	4,181

[^] Service a population of 5,000 to 20,000 people on average. *2008 data. Table modified from Papua New Guinea Health Service Delivery Profile (2012). Original source: National Health Plan 2011-2020. Vol.2 and Health Human Resource Review of the World Bank, 2007.

Traditional medicine

A rich tradition of herbal medicine and medicinal plants use exists in PNG with well over 50 percent of the population relying exclusively on traditional herbal medicine for health care. A Traditional Medicine Database is well established detailing over 4,500 traditional preparations from approximately 850 plant species (Rai et al 2015). The primary objectives of this database are to:

- To serve as a repository of indigenous knowledge in traditional medicine
- To identify safe and effective traditional medicine practices and promote their usage in the community
- To select promising herbs and traditional medicines for scientific research.

There is a National Policy on Traditional Medicine that aims to incorporate traditional medicine in the primary health care system.

Water and Sanitation

PNG is one of only three countries globally that has safe water coverage of less than 50 percent. It also has the twelfth highest proportion of people using unimproved sanitation (WaterAid 2017). Less than 20 percent of rural households have access to electricity, 60 percent lack access to safe drinking water, and an estimated 80 percent lack access to improved sanitation.

PNG has the lowest water and sanitation access indicators amongst the 15 developing Pacific Island nations. The latest update of the UN's Joint Monitoring Program (JMP 2018) estimates access to safe drinking water and improved sanitation in PNG in 2012 at 40% and 19% respectively. Over the period of more than two decades since 1990, the increase in access to safe drinking water has been very small (access in 1990 was 34%), while improved sanitation coverage recorded a drop from 20% in 1990 to 19% in 2012.

Nutrition and Food Security

Malnutrition is estimated to contribute to more than a third of childhood deaths with 22.6% of children under 5 years underweight for their age (GoPNG 2016).

The national malnutrition rate steadily declined among children under 5 years from 2012 to 2016. Madang has the highest rate of malnutrition in the country at 31 percent and Enga's rate is increased from 16 percent to 25 percent between 2012 and 2016. A significant reduction in malnutrition was seen in the Western Highland Province from 23% in 2012 to 14% in 2016 (GoPNG 2017).

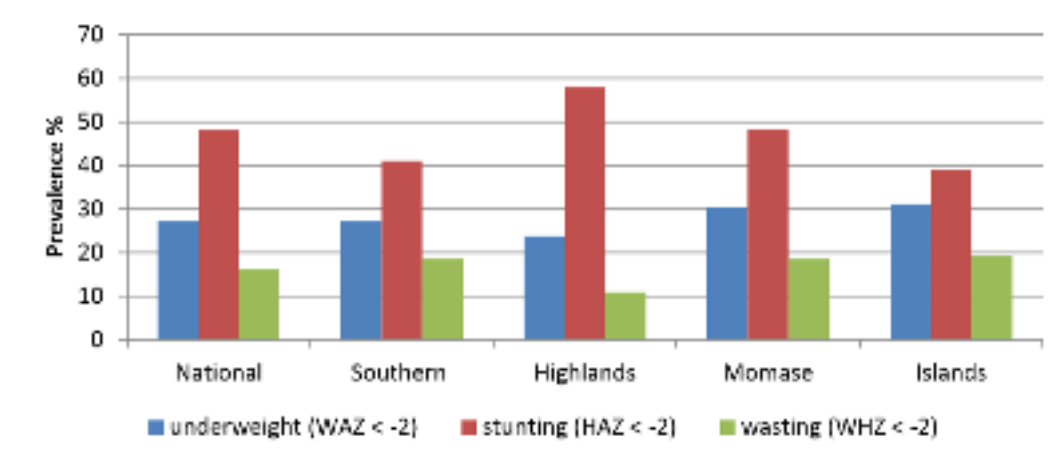


Figure 13 Prevalence of underweight, stunting and wasting

Source: (GoPNG 2015).

Household Food Security

Food security remains a crucial yet poorly defined issue on PNG's development agenda. In general, the data necessary to assess the four dimensions of food security – availability, access, utilization and stability – has either not been systematically collected, or where it is available it is not being utilized to provide the evidence base for sound decision making (NFSP 2015). There is a general assumption that because the majority of people have access to land, that this means they have subsistence food crops and the ability to generate a cash income (NFSP 2015). The vulnerability of PNG's households is seen in disaster events that generate food shortages and starvation.

At the time of the 2011 Census, growing food crops, vegetables and root crops and rearing livestock were the main activities 74% and 44% of households were engaged in respectively. For the households engaged in growing food crops, vegetables and root crops, 77% did so for their own consumption. PNG's food security remains reliant on the ability of the rural community to grow subsistence crops and surplus for market produce that provide cash to purchase food (NFSP 2015).

In the cocoa sector, an average of 90% of households surveyed reported being food secure by producing enough food for their requirements. In AROB, there was a higher reporting of potential food insecurity than in ENB, with 23% of households stating that they produced insufficient food for subsistence requirements, with this figure as high as 42% in Tinuput (UniQuest 2013).

D.5 Education

The level of education in PNG is poor with some 50 percent of the adult population not having the benefit of basic education. A gender imbalance is prevalent with the majority of statistics showing education levels of girls and literacy rates in women as less than boys and men.

In 2007, 62% of students completed Grade 6 in PNG (GoPNG 2009). Enga Province had the lowest completion rates (28.9%) followed by Southern Highlands and Chimbu (41.8%). East New Britain had the highest completion rate followed by Central, New Ireland, Western and NCD (>90%). In 2018, 50% of schools did not have sanitation facilities (JMP 2018).

On a national scale, only 14.8% of the population (age 6 and over) has attained secondary education. In the Highlands Region only 15.3% of males and 10.4% of females have attained secondary education and in the Momase Region 10.9% of males and only 6.5% of females (NSO 2011).

There are a number of reasons for poor retention rates in schools. These can be divided into: (i) In-School Factors (financial burden of school fees, lack of educational materials, lack of adequate school infrastructure, poor teacher attitude and attendance, remoteness and negative pupil behaviour) and (ii) Out-of-School Factors (lack of parental support and community responsibility towards education of children, the relevance of schooling and tribal fights) (GoPNG, 2009). Results from the PNG Household Income and Expenditure Survey identify the most significant reasons for both male and female students stopping to attend school was from not passing exams and not being able to pay school fees, particularly in rural areas (NSO 2011).

D.6 Gender

PNG has a Gender Inequality Index (GII) value of 0.741, ranking it 159 out of 160 countries in 2017¹⁰. Female participation in the labour market is 69.0 percent compared to 70.8 for men (UNDP 2018). Although the fertility rate has dropped from 4.8 births per woman in 1990 to 3.7 births per woman in 2017, the adolescent fertility rate for females aged 15-19 years (53%) and women aged 20-24 years who are married (21%) are comparatively high (WHO 2018; WDI 2019).

Traditional societies in PNG typically have different and unequally valued spheres of gendered activity. A woman is usually responsible for most of the subsistence needs of her household, cultivating crops, gathering food and fishing, collecting water and fuel for cooking, caring for domestic animals, bearing, raising and feeding young children and caring for older and sick members of the family. A man clears the land for cultivation, plants some crops (especially those with ritual significance), hunts and fishes (producing scarce and highly valued foods), builds houses and fences, and defends his family and village or makes war (in some parts of the country). Men are responsible for the religious and political spheres (Brun 2018).

Bride Price

The payment of a bride price in which a woman's fertility and labour are acquired from her father, entails husbandly authority over a woman's labour. Despite their essential contribution to the social and economic well-being of the family, women, in general, exercise limited control over household decisions. Women take an increased responsibility of earning money but men often make the decisions about spending family income. Men, also, usually decide about the use of household and land resources. The amount of work does not reduce for pregnant women (Brun 2018).

Opportunities

Gender norms and attitudes constrain women's work and economic opportunities and hamper productivity. Low education levels, safety and security issues and cultural attitudes contribute to the low representation of women in wage employment. Although participation rates in the labour force are relatively even, men are almost twice as more likely than women to hold a wage job in the formal sector and women are three times more likely than men to work in the informal sector (Brun 2018).

See Section D.8. for more information about women's access to land.

Gender-based Violence

There is currently no national data on the prevalence of gender-based violence (GBV) in PNG. Nevertheless, several studies indicate that the rates of family and sexual violence (FSV) are among the highest in the world, particularly in the rural Highlands. While men primarily experience violence outside of family relations, women are five times more likely to be victimised at home than on the street.

Recent surveys¹¹ have estimated that:

- 68% of women have experience physical and/or sexual violence by a partner
- Women in relationships are more vulnerable to experiencing violence
- 68% of women have experience GBV in the past year
- 41% of men admit to having raped someone and 7.7% have perpetrated male rape
- 44% of sexual abuse victims are males under the age of 15 years
- Polygamous marriages put women in competition with one another leading to conflict and/or violence
- Customary practice can lead to females as young as 14 years old being forced to marry (despite the legal age being 16 years old)
- Customary practice of bride price leads men to believe they have the right to control their wives (with violence if necessary) and women unable to escape because they cannot repay bride price

¹⁰ The GII is calculated based on the fact no parliamentary seats were held by women, 9.5 percent of adult women have reached at least a secondary level of education compared to 15.0 percent of their male counterparts; for every 100,000 live births 215 women die from pregnancy related causes; and the adolescent birth rate is 52.7 births per 1,000 women of ages 15-19 (UNDP 2018).

¹¹ Sources: Thomas et al 2017, Darko et al 2015, Kopal et al 2017, Mishar et al 2017, UNIFEM 2010.

- For women employed in the formal sector in urban areas, they experience an average of 9.4 incidents of GBV in the past year. The three most prevalent forms of GBV were physical assault, physical threats and financial deprivation.

A recent study by Thomas et al (2017) concluded that the **main cause of violence was disagreement about the way money was spent**, which primarily affects women in relationships most of whom are engaged in informal employment (>83%).

Highlands

Polygamous marriages represent 28.6% of the unions in the Highlands. These situations can exacerbate women's vulnerability if a man takes several wives but does not distribute the financial resources equally (Brun 2018).

The number of women affected by violence varies across provinces: Western Highlands 79.2%; Goroka 77.8%; and Goroka (rural) 44.4% (UNIFEM 2010). As stated above, roughly two-thirds of Papua New Guinean women had been abused by their husbands, and there is evidence to suggest the rate is 88% or higher in the Highlands (Brun 2018).

The patrilineal land tenure system in the Highlands disadvantages women by constraining their ownership of, and access to, land. As land is critical to enabling a livelihood, women have major difficulties escaping a violent relationship as there is no certainty that, if they return to their natal village, they will be granted access to land (Brun 2018).

Coastal Provinces

The number of women affected by violence varies across provinces: Madang town 68.2%; Bougainville 58.3%, Madang Province (rural) 52.5% (UNIFEM 2010).

Agriculture

In 2014, the World Bank released 'Fruits of Her Labour Report'. The main findings of the report were that:

- Women are key to quality as they play an important role in time-critical and quality-relevant tasks
- Labour dynamics affect outcomes, primarily due to the domestic burden women face and constraints
- Critical support services are limited and poorly targeted (e.g. extension services, training and finance) and
- Systemic issues affect supply chain performance.

Women are directly engaged at critical stages of coffee and cocoa production and processing; in coffee: picking (often strip picking) cherry, pulping, fermenting, and drying; in cocoa: harvesting, breaking the pods, sorting of beans, transport of wet beans for fermenting, putting wet beans in the fermentary, and managing the drying. All of these are time-critical tasks: they must be undertaken promptly in relation to harvesting, and for a specific amount of time. In both sectors, these tasks substantially determine the quality of the coffee and cocoa delivered to the exporter.

In terms of labour dynamics, the following issues prevail:

- Smallholders do not view their activity or farm as a business
- Labour is allocated for social purposes and obligations rather than linked to market drivers
- Farmers experience labour shortages since subsistence food production takes priority for most households, there are seasonal peaks and some people tend to be involved in farming when they need cash
- Smallholder farmers are very diversified reducing dependence on one crop for cash income
- Women are confined to and can only benefit from short supply chains due to safety issues and limited transport access.

Rural smallholders do not yet have the benefit of a consistent supply of reliable, quality and affordable inputs. Furthermore, they face specific constraints when accessing finance and credit as they do not meet lending criteria and cannot use customary land as collateral.

D.7 Employment and Household Economics

Labour-force participation

Women have lower labour-force participation than men (70.5 percent for women compared to 74 percent for men), and lower estimated per-capita income (World Bank 2019; Eves et al 2018).

Men work longer hours in profitable activities, especially in cocoa and coffee activities. Women are particularly busy with domestic activities and are more likely to run their own business alongside other farming activities, than working with coffee or cocoa. Women are generally involved in the lower-value stages of the cocoa value chain such as harvesting and sale of wet beans, and men capture more of the value at later stages such as drying and sale of dry beans (World Bank 2018).

The average number of hours spent in cocoa production by men is almost triple that of women and double in the coffee growing areas. But comparing total hours worked including domestic work, women on average work 2.7 hours more per day than men in cocoa-growing areas and 1.7 hours more per day in coffee-growing areas (World Bank 2018).

Household Decision-making

The level of food self-sufficiency is generally considered to be a major factor in decision-making regarding commercial crop production. Where self-sufficiency is high in PNG, commercial crops are produced to provide essentials that cannot be produced domestically and other luxury items. Once these items are procured there is little pressure to accumulate further cash income (UniQuest 2013).

Intra-household decision making processes influence the allocation of time and household efficiency. When it comes to purchasing decisions, partners often make decisions together, but women are more likely than men to make decisions alone. In cocoa-growing areas owning a phone or having access to the internet significantly correlates with higher bargaining power for women. However women's bargaining power is less when household asset wealth increases in couples, and within larger households (World Bank 2018).

Cocoa sector

ENB households earned significantly more income from coconut and balsa than ARB households, almost entirely due to the production at Bitapaka. Income from livestock was significantly higher in ARB than in ENB, with Buin households contributing most strongly to this outcome. Income from alternative cash crops was higher in ENB than ARB (UniQuest 2013).

Bank accounts were operated by 68% of households in ENB but only 23% in ARB. Accounts were predominantly held with the major banks (57% of primary accounts), although use of savings and loans societies (32% of primary accounts) and microfinance institutions (11% of primary accounts) were also common. Ninety percent of households listed men as the primary account operators, but women were significant as secondary accounts operators (approximately 80% of accounts).

Household labour for cocoa production was primarily committed to selling cocoa and weeding during the production phase. Pest and disease management during the establishment phase was also undertaken relatively infrequently by households (9% of households), but this was far more undertaken in the production phase (17%) [UniQuest 2013].

Coffee sector

Gender inequality in the coffee sector contributes to low productivity. Women in coffee producing areas suffer disproportionately, working longer hours than men and receiving less than a third of their income. In 2015, less than 10 per cent of women farmers had access to extension services and only five percent of the farmers who received extension training were women. The meaningful involvement of women in the coffee industry is necessary to ensure the quality of the final coffee product (CARE 2017).

The Coffee Industry Support Project (CISP) implemented by CARE International since 2013, aims to improve the economic and social wellbeing of women coffee farmers in the highlands provinces of PNG. The project supports coffee industry stakeholders to mainstream gender equity in their policies, practices and approaches. CISP increases women's access to training and extension services. It improves family business management practices so smallholder coffee farming families can work together more effectively. This enables the whole family to benefit from coffee production and income (CARE 2017).

UniQuest undertook a baseline survey of farmer households for the PPAP in 2013. The study found that 22% of households surveyed had a bank account. A further 2% of households had accounts with savings and loan societies, 7% with microfinance institutions and 1% with other institutions. Accounts were almost exclusively operated by men and only 1% households kept records related to coffee production (UniQuest 2013).

Primary sellers of coffee were men, who sold on behalf of 90% of households. In contrast, only 44% of income receivers were men, compared with 56% of income receivers being women. Almost 99% of households were paid for their coffee in cash. Cash payments were the preferred method of payment by 95% of households. However, a small percentage preferred being paid by direct deposit (4%) or by cheque (1%) [UniQuest 2013 p55].

Total per capita income was significantly correlated with factors such as:

- No of training types attended – households with more training had higher incomes
- Access to information on coffee
- Remoteness
- Reliance on coffee income
- Education level of household head – household heads with Grade 7 education or higher had higher incomes
- Time invested in agronomy, harvesting and record keeping, relative to the time allocated for establishment activities tended to have higher incomes

The study found significant correlations between remoteness and the percentage of income earned from coffee and cash crops. The more remote locations tended to earn more of their income from coffee and less from cash crops, whereas less remote households earned less from cash crops and more from coffee sales. The low perishability of coffee as parchment or green bean, compared with the relatively high perishability of most cash crops is assumed to be a contributing factor to this outcome.

Activities that were very rarely or never undertaken included farm record-keeping, fertilising and mulching and pest and disease management. Only 15% of households undertook fence construction and maintenance in 2011. Very few households considered safety or the environment when washing spray equipment or disposing of chemical containers. Some households reused chemical drums to store drinking water. Similarly, coffee waste was opportunistically managed, usually by distributing waste on adjacent gardens.

Table 8 Role perceptions

Activity	Men	Women
Land clearing	87	76
Planting	73	48
Weeding	61	77
Picking	53	83
Wet Milling	48	58
Drying	49	62
Selling	82	61
Domestic Chores	25	96

Source: World Bank, 2014.

D.8 Land and Resource Ownership

Customary Rights

Land Rights

Social groups (tribes, language group) occupy (or have rights to occupy) specific territorial domains determined by historical circumstance. Rights are held by the group or by sub-groups (these are often referred to as sub-clans within the larger clan that are related extended families), which are protected through agreements with neighbouring clans. The rights of landowning groups are based on memories of mutually agreed-upon histories that describe how they came into being and occupy the land, either descend from a common male or female ancestor (resulting in land tenure being either patrilineal or matrilineal depending on the area).

Adoption and change of group membership is common in PNG, influencing the local land tenure system and decisions. It also enables the group to adjust the numbers of people according to the amount available. All members of the landowning group are bound by social and economic obligations to other members (referred to as the 'wantok' system). Through the exercise of these obligations and daily social interactions, rights to use land are strengthened (Bourke & Hardwood 2009). With the high degree of internal migration within PNG, there are many instances of absentee landholders, which can add time and complexity to any land dealings.

Landholdings of a particular landowning group may not be adjacent, but scattered throughout a larger territory. While land parcels may be used by an individual family, the rights to use them do not necessarily not reside in one person, but in a number of close relatives. The rights held by different people in the same piece of land vary in nature and in degrees of importance. The use of land for cultivation is decided upon in consultation within the family (Bourke & Hardwood 2009 p428).

The intimate details of customary land, and of many generations of land use, are an integral part of the memory of the landowning group. For traditional landowners in Papua New Guinea the terms and conditions of sale may be subject to review by future generations, descendants of the original sellers, who may seek to renegotiate the sale and impose new conditions not envisaged by either the original sellers or buyers. For the majority of the population in Papua New Guinea land is their only significant resource and a very large proportion of the rural population depend on subsistence food production based on this land resource.

The sale of land represents, in the vast majority of cases, the loss of the patrimony of future generations. Accordingly, future generations may be vigorous in their pursuit of redress of what they see as the inadequate land sales settlements of past generations.

Furthermore, customary tenure systems can be very reactive to external influences such as large project development or increasing urbanisation. Change may result in rights to use customary land being restricted to male descendants, excluding people 'adopted' over the years and/or conclusion of usufruct arrangements.

Access and resource use rights

It can be difficult for women (married and unmarried) and unmarried men to gain access to land on which to plant crops. It is not necessary to be a customary landowner to use a piece of land temporarily (i.e. for the purpose of cultivation) (Bourke & Hardwood 2009 p428).

Land can be (and is) cultivated by a non-rightholder, with permission of customary rightholder (user rights). When a person does not have rights to a piece of land uses it without paying rent, the use is known as 'usufruct' (i.e. usufruct rights). This is how people who cannot establish rights to land within a group can be given land on which to grow food and build houses (i.e. widows, migrants from other areas). Usufructuary arrangements are usually limited to growing annual crops.

Women and land

Women have rights to cultivate land, gather forest products and to fish for or collect marine and riverine resources but, regardless of whether their society's descent and inheritance system is based on patrilineal or matrilineal principles, they are rarely considered to have ownership rights over productive resources. Some of the challenges faced by women in agriculture are similar to those faced by men (lack of access to technologies and inputs and to market information) but women face more severe constraints in other areas. These include lack of access to appropriately timed credit, scarcity of formal savings or loan systems available to women in communities, lack of decision-making control over land

use, less effective outreach to them by extension services, and lower knowledge of important links in the value chain (Bruin 2018).

Alienated land

Customary land cannot be purchased or sold. Customary land, however, can be alienated purchased by the State and leased to other users. In these cases, customary landholders legally lose interest in the land.

Coffee sector

Nearly all households surveyed (98.1%) farmed customary land to produce their coffee and other agricultural products (UniQuest 2013). There were a small number of households farming rented and freehold land in Simbu Province and a very small number in Jiwaka Province. Rented land was rented from relatives/customary owners. There were also a small number of households farming leasehold land in WHP and EHP. Customary land was farmed by more than 96% of households in all provinces.

Most households farmed customary land. Less than 2% of households reported farming land that was either rented, freehold or leasehold. Most households (77%) intended to plant additional coffee in the next two years by planting into old gardens or regrowth forest. Only a 5% of households intended to clear virgin forest for planting. These households were concentrated in remote locations in Jiwaka Province.

Cocoa sector

Most households farmed customary land but the proportion was slightly higher in ARB (96% of cocoa blocks) compared with ENB (92% of cocoa blocks). About 14% of cocoa blocks in ENB were leased from other clan members. There was small number of households farming freehold land on ENB (UniQuest 2013). Most households (88%) intended to plant additional cocoa in the next two years. In ENB, 75% of households intended to new replant old cocoa blocks, with the remainder planting into other previously cleared areas. The situation was different on Bougainville, where 21% of farmers intended clearing virgin forest to plant cocoa and only 22% were replanting old cocoa blocks.

PART TWO

E. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

This section provides a brief summary of risks and potential impacts that could occur during, and/or as a result of PACD. These may either be site-specific or at the project-level.

E.1 Potential Impacts and Mitigation

Component 1

Building the capacity of Commodity Boards and Provincial and District Authorities will strengthen the services they deliver and benefit farmers in rural areas.

Policy and regulatory reforms are likely to be largely positive, particularly in the areas of climate-smart agriculture, extension and veterinary services, quality standards and food safety. However this may result in adverse impacts at the producer/farmer-level: (i) additional costs to meeting new standards and (ii) increased competitiveness.

There have been significant social benefits and positive outcomes in farming communities through the increased ratio of extension officers (EO) in rural areas (i.e. 1 EO per ~300 farmers compared to 1 EO per 40,000+ people) under PPAP. Should extension officer services at appropriate ratios continue, positive livelihood outcomes will remain.

With the addition of new sector (livestock, spices, coconut) in PACD, there is potential for EOs to be reduced or spread more thinly across different sectors. If the ratio of extension officers is not maintained, it is likely to adversely affect production capacity and livelihood outcomes.

Overall, this component is expected to result in positive social, environmental, health, safety and hygiene impacts.

Component 2

The project will invest in infrastructure networks which will involve the rehabilitation of feeder roads and the refurbishment and/or development of small-scale municipal infrastructure (e.g. small-scale slaughter house and laboratories). This is expected to result in the following positive impacts:

- Improved access to markets
- Improved access to and quality of municipal facilities
- Improved animal welfare
- Greater opportunities for diversification of agricultural activities for households

These investments have the potential to also cause some minor adverse environmental and social impacts as listed in Table 9.

Table 9 Potential impacts associated with Component Two

Pre-construction	<p>Materials supply - gravel, concrete, asphalt, etc.) – environmental compliance in controlling dust and material spillage/loss during transport, delivery and storage; sustainability of the source of natural materials; licensed sources of aggregates</p> <p>Noise and dust generation</p> <p>Chance finds of cultural heritage</p> <p>Land acquisition</p> <p>Physical or economic displacement of people</p>
Construction	<p>Noise and dust generation</p> <p>Chance finds of cultural heritage</p> <p>Management of soil wastes (hazardous and non-hazardous) – collection, transport, and disposal of any debris</p>

	Management of oil and fuel for construction equipment and associated spills from construction vehicles Influx of workforce Worker and public health and safety Traffic management Soil erosion and sedimentation from worksites during excavation activities Air quality from operating machinery, generators and dust from earthworks
Post-Construction	Disposal of soil wastes Disagreement about asset ownership and maintenance responsibilities at project closure

These are expected to be readily managed through standard mitigation measures as illustrated in Table 10.

Table 10 Summary of mitigation measures

Adverse Impact	Mitigation or Management tool	Responsibility
Short-term construction phase disturbances such as: Noise, dust, sedimentation, public health and safety risks, worker health and safety	ESMP	Contractor
Vegetation clearing, timber felling, materials supply, generation of waste	ESMP	Contractor
Impact to forests through use of firewood for cocoa dryers	Education and distribution of seedlings	Lead Partner
Water demand and contamination	Operational ESMP	Lead Partner
Potential land disputes and compensation claims	Siting on government land Guidance in RPF	PMU and Provincial Govt
Greater demand for water for operational facilities	ESMP	PMU and Contractor
Potential for contamination of water streams during construction or operation (discharge)	Siting infrastructure away from water bodies ESMP	Contractor and Provincial Govt CEPA for permitting
Air quality impacts	ESMP	Contractor and Govt
Generation of hazardous waste	ESMP	Contractor and Provincial Govt
Pedestrian safety along feeder roads	ESMP and traffic management	Contractor and LLG

Temporary loss of access or restricted access to property	Consultation and ESMP	Contractor
Issues of road maintenance responsibility (feeder roads responsibility of LLG/District but not budgeted).	MoU	LLG/DDA
Risks	Mitigation or Management tool	Responsibility
Poor quality of construction	Design check and sign off by engineer	Senior Engineer
Exclusion of key stakeholders in project meetings and activities	Inclusion of Ward Counsellor and LLG Manager(s); Stakeholder Engagement Plan	CLLO
Municipality has not budgeted for operational or maintenance costs	MoU	PMU and Provincial Govt
Workforce influx and behaviour behaviour (especially if renting local houses in village)	Workforce code of conduct, accommodation options and monitoring	Contractor
Inflated expectations about how farmers will benefit	Stakeholder Engagement Plan	PCU and PMU
Disturbance of cultural heritage sites	Chance Finds Procedure in ESMP	Contractor
Community safety / theft	ESMP	CLLO/Contractor
Dispute over asset ownership, access and maintenance	MoU, CLUA and Partnership Agreement	PMU
Triggering or exacerbation of social conflict or tension due to increasing wealth and jealousy	Stakeholder Engagement Plan and regular monitoring visits	CLLO
Farmers unaware of dangerous practices such as agrochemical use by children and pregnant women.	Education and capacity building	Training Officer

Component 3

The project will finance small-scale infrastructure for partnerships including innovative technologies, notably on climate smart agriculture (agro-forestry, water collection and micro-irrigation, drought resistance varieties, intensification of poultry/pigs production and bio-digesters). The provision of small-scale facilities is expected to have a significant positive impact on the improvement of livelihoods. It is anticipated that this will bring about the following positive impacts:

- Agricultural systems more resilience to climate impacts and severe weather conditions
- Improved access to processing and storage facilities
- Increased capacity of farmers
- Greater opportunities for diversification of agricultural activities for households

Negative environmental and social impacts associated with these activities are expected to be minor, localized and temporary primarily because of their small-scale and household/community focus.

Table 11 Summary of impacts and risks associated with Component Three

Negative Impact	Mitigation or Management tool	Responsibility
Short-term construction phase disturbances such as: Noise, dust, sedimentation, public health and safety risks, worker health and safety	ESMP	Contractor
Potential land disputes and compensation claims	Guidance in RPF	Ward Counsellor CLLO Lead Partner
Lack of consensus over ownership of asset and responsibility for long-term maintenance	MoU and CLUA	Ward Counsellor CLLO Lead Partner
Increase demand for local natural resources (e.g. timber, firewood)	SMP	Ward Counsellor CLLO Lead Partner
Potential for contamination of water streams during construction or operation (discharge)	Siting infrastructure away from water bodies ESMP	Contractor and Provincial Govt CEPA for permitting
Increased fertiliser, pesticide, insecticide and herbicides leading to health risks if used without training and control measures	Training module (chemical handling, contamination of drinking and washing water supply)	Lead Partner
Risks	Mitigation or Management tool	Responsibility
Poor quality of construction	Design check and sign off by engineer	Senior Engineer
Exclusion of key stakeholders in project meetings and activities	Inclusion of Ward Counsellor and LLG Manager(s)	CLLO

Component 4

None applicable.

Component 5

There is potential for the project to invest in emergency response and recovery operations in the event of a disaster declared by the GoPNG. This is likely to involve clean-up of debris, removal of waste, repair of critical infrastructure such as roads, bridges, drainage and telecommunications, provision of water and supplies, bulk storage, cost of land and sea transport for supplies, and revegetation and

stabilisation of areas of erosion. Impacts may be short-term and will result in positive social and environmental outcomes.

F. REFERENCES

- ABG (2015). Map of Autonomous Region of Bougainville district boundaries. Accessed on 10 February 2019 at http://www.abg.gov.pg/images/misc/BOUGAINVILLE_ISLAND_SEPT_2015_A3_%282%29_-_Large_Legend.compressed.pdf
- ABC Radio (2017). 'PNG Bee farmers plea for help in tackling deadly mite', 18th April 2017. Accessed 20 February 2019 at <https://www.abc.net.au/radio-australia/programs/pacificbeat/png-bee-farmers-plea-for-help-in-tackling-deadly/8451402>
- ADB (2017). Climate Change Vulnerability Assessment for the Multi-tranche Financing Facility for the Sustainable Highlands Highway Investment Program, PNG. Project Number 48444. Accessed on 10 February 2019 at <https://www.adb.org/projects/48444-002/main>
- Author Unknown (2015). Jiwaka Province, Tok Pisin English Dictionary, accessed 23 February 2019 at <https://www.tokpisin.info/jiwaka-province/>
- Author Unknown (2015). Southern Highlands Province, Tok Pisin English Dictionary, accessed 23 February 2019 at <https://www.tokpisin.info/southern-highlands-province/>
- Bandem, Jaya (2018). How did so many languages develop in a relatively 'close' area in Papua/New Guinea? Accessed on 5 February 2019 from <https://www.quora.com/How-did-so-many-languages-develop-in-a-relatively-close-area-in-Papua-New-Guinea>
- Bourke, R. M., and Harwood, Tracey (2009). Food and Agriculture in Papua New Guinea. ANUE Press: Canberra ACT. Accessed 10 December 2018 from <https://press-files.anu.edu.au/downloads/press/p53311/pdf/book.pdf>
- Brun, Delphine (March 2018). CARE Rapid Gender Analysis, Papua New Guinea – Highlands earthquake. Accessed on 10 February 2019 at https://fscluster.org/sites/default/files/documents/care_rapid_gender_analysis_png_earthquake_28032018.pdf
- CABI (date unknown). Improved management strategies for cocoa in Papua New Guinea. Accessed on 10 February 2019 at <https://www.cabi.org/projects/project/33019>
- CARE (Sept 2017). CARE International in PNG, Coffee Sector Industry Support Project: Mid-term Evaluation Report. Accessed 2 December 2018 from <https://www.careevaluations.org/evaluation/png-coffee-industry-support-project-mid-term-evaluation-report/CIC> (2018). Coffee Industry Corporation Strategic Plan. Goroka, Eastern Highlands Province, Papua New Guinea.
- CIC (2016). Apiculture in PNG, speech by Dr Nelson Simbiken, Acting Chief Scientist, CIC. Accessed on 9 February 2019 at <http://www.cic.org.pg/2016/09/08/apiculture-in-png/>
- CLGF (2018). Papua New Guinea Factsheet. Accessed 1 February 2019 from http://www.clgf.org.uk/default/assets/File/Country_profiles/Papua_New_Guinea.pdf
- Coulombe, Harold (2018a). Productive Partnership in Agriculture Project: A midterm cocoa sector impact evaluation (draft). Unpublished.
- Coulombe, Harold (2018b). Productive Partnership in Agriculture Project: A midterm coffee sector impact evaluation (draft). Unpublished.
- Curry, G.N., Koczberski, G., Omuru, E., Duigu, J., Yala, C. and Imbun, B. (2007). Social Assessment Report for Smallholder Agriculture Development Project (SADP) Papua New Guinea. Accessed 2 December 2018 from <http://documents.worldbank.org/curated/en/695851468086341172/Papua-New-Guinea-Smallholder-Agriculture-Development-Project-social-assessment>
- Darko, Smith and Walker (2015). Gender Violence in Papua New Guinea: the cost to business report. ODI. Access on 6 February 2019 from <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9886.pdf>
- DFAT (2018). Papua New Guinea Country Brief. Accessed 10 February 2019 at <https://dfat.gov.au/geo/papua-new-guinea/Pages/papua-new-guinea-country-brief.aspx>

DNPM (2016). FAQs. Accessed 2 December 2018 from <http://www.planning.gov.pg/index.php/2016-02-01-01-28-54>

Eves et al. (2018). 'Do No Harm Research Papua New Guinea', Canberra; Department of Pacific Affairs, The Australian National University.

EMTV News (2016) 21 Dec 2016, viewed 20 February 2019 at <https://emtv.com.pg/bee-farmers-association-calls-on-government-to-spend-on-pngs-lucrative-honey-industry/>

Frenken, Karen (2012). Irrigation in Southern and Eastern Asia: AquaStat Survey – Papua New Guinea 2011 data. FAO Land and Water Division: Rome. Accessed 20 January 2019 from http://www.fao.org/nr/water/aquastat/countries_regions/PNG/

Government of Papua New Guinea (GoPNG) (2009) Universal Basic Education Plan 2010-2019, Department of Education.

Government of Papua New Guinea (GoPNG) (2010) National Health Plan 2011-2020, Vol.1 Policies and Strategies and Vol. 2, National Department of Health.

Government of Papua New Guinea (GoPNG) (2015) Draft National Food Security Policy (NFSP) 2016-2025, Department of Agriculture and Livestock.

Government of Papua New Guinea (GoPNG) (2016) Provincial and District Health Profiles, National Department of Health.

Government of Papua New Guinea (GoPNG) (2017) National Health Plan 2011-2020 – 2016 Sector Performance Annual Review, National Department of Health.

JMP (2018). WASH Data: Papua New Guinea Country Profile. Accessed 1 February 2019 from: <https://washdata.org/monitoring/schools/country-files-2018>

KIK (2016). Coconut Industry Strategic Plan 2016-2025, Kokonas Industri Koporesen, Port Moresby.

Kopal, Elizabeth, Hukula, Fiona, Kutan, Lindsay and Iwong, Lewis (2017). Understanding the Gender Dynamics of the Informal Economy: The case of open markets in Port Moresby. Accessed 1 February 2018 from <https://pngnri.org/images/Publications/Understanding-gender-dynamics-of-the-informal-economy-Nov2017-copy.pdf>

Mishar, Vinod, Odhuno, Francis and Smyth, Russell (2017). Do women face different barriers from men when participation in SMEs? Empirical evidence from Papua New Guinea. Accessed 1 February 2019 from <https://pngnri.org/images/Publications/Do-women-face-different-barriers-than-men-when-participating-in-SMEsNov2017.pdf>

NRI (2010). Papua New Guinea District and Provincial Profiles, March 2010. Accessed 1 February 2019 from <https://pngnri.org/index.php/our-research/publications>

National Statistics Office (2011). Household Income and Expenditure Survey (HIES) 2009-10. Accessed 1 February 2018 from <https://www.nso.gov.pg/index.php/projects/household-income-expenditure-survey>

National Statistics Office (2009). Papua New Guinea Demographic & Health Survey 2006. Accessed 1 February 2019 from <https://www.nso.gov.pg/index.php/projects/demographic-health-survey/48-dhs>

OCHA (2011). Seismic, volcanic and tropical cyclone risk. Accessed 1 February 2019 from https://reliefweb.int/sites/reliefweb.int/files/resources/OCHA_PNG_Hazard_v4_110606.pdf

Thomas, Verena, Kauli, Jacqueline, & Rawstone, Patrick (2017). *Understanding gender-based and sorcery related violence in Papua New Guinea*. Oxfam, Papua New Guinea. Accessed 1 February 2019 from <https://eprints.qut.edu.au/118394/>

Rai, Prem, Matainaho, Teatulohi and Barrows, Louis (2015). *Research and Development in Papua New Guinea Traditional Medicine*. Third International Conference and Exhibition on Traditional & Alternative Medicine, August 03-05, 2015, Birmingham, UK. Accessed 21 February 2019 from <https://d2cax41o7ahm5l.cloudfront.net/cs/speaker-ppts/prem-p-rai-university-of-papua-new-guinea-papua-new-guinea.pptx>

Strydom, Werner (2014). Papua New Guinea. Accessed 21 February 2019 from <https://wernerstrydom17.wordpress.com/2014/10/06/papua-new-guinea/>

Pue A.G., Fletcher M.T., Blaney, B., Greenhill, A. R., Warner, J. M., Latifa, A and Ng, J. C. (2018). Addressing Food Insecurity in Papua New Guinea Through Food Safety and Sago Cropping. In: Ehara H., Toyoda Y., Johnson D. (eds) Sago Palm. Springer, Singapore. Accessed 17 Jan 2019 from DOI https://doi.org/10.1007/978-981-10-5269-9_9

UNAIDS (2018). Aids Info: Papua New Guinea. Accessed 6 February 2019 from <http://aidsinfo.unaids.org>

UNDP (2018). Human Development Indices and Indicators: 2018 Statistical Update. Accessed on 6 February 2019 from http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/PNG.pdf

UNIFEM [now UN Women] (2010). Ending Violence Against Women and Girls Report: Evidence, data and knowledge in Pacific Island Countries. Accessed 1 February 2018 from <https://www.unicef.org/pacificislands/evaw.pdf>

UniQuest (2013). P110959 Productive Partnerships in Agriculture Project Baseline Survey, Final Report May 2013.

WaterAid (2017) Papua New Guinea Country Strategy 2017- 2020. <https://www.wateraid.org/au/where-we-work/papua-new-guinea>

WHO (2018). Vaccine and preventable diseases, Global monitoring report. Accessed on 6 Feb 2019 from http://apps.who.int/immunization_monitoring/globalsummary/countries?countrycriteria%5Bcountry%5D%5B%5D=PNG&commit=OK

World Bank (December 2014). Fruits of Her Labour: Promoting gender-equitable agribusiness in Papua New Guinea (Cocoa Sector). Accessed 1 February 2019 from: <http://documents.worldbank.org/curated/en/862511468190437817/pdf/ACS10004-v3-Box391477B-PUBLIC-IFC-003-WBG-Report-COCOA-FA-R-PUBLIC.pdf>

World Bank (2017a). Rural WASH Sustainability Study. Available at: <http://documents.worldbank.org/curated/en/585101508396134067/pdf/P150648-10-19-2017-1508396130729.pdf>

World Bank. (2017b). *Papua New Guinea - Water Supply and Sanitation Development Project (English)*. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/591931485443649141/Papua-New-Guinea-Water-Supply-and-Sanitation-Development-Project>

World Bank (2017c). Country Profile: Papua New Guinea. World Bank Database Accessed 1 February 2019 from: https://databank.worldbank.org/data/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=PNG

World Bank (2018). Household allocation and efficiency of time in Papua New Guinea. IBRD: Washington USA.

World Bank (2019). PAD2966 Project Appraisal Document for the PNG Agriculture Commercialisation and Diversification Project (draft). Unpublished.

WWF (2017). Island magic in the Pacific: Forest areas in New Guinea. Accessed on 2 December 2018 from http://wwf.panda.org/knowledge_hub/where_we_work/new_guinea_forests/area_forests_new_guinea/

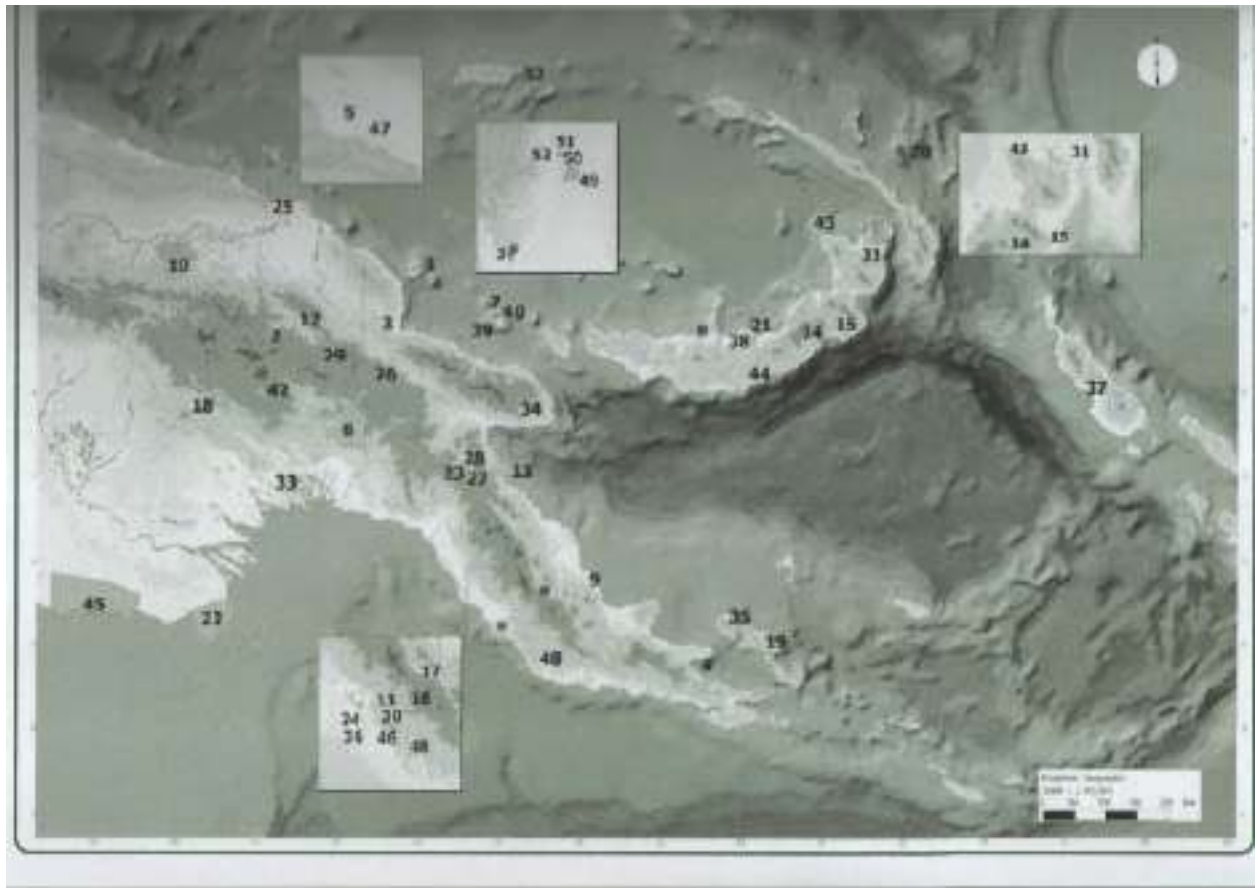
APPENDIX 1 PROTECTED AREAS IN PNG

This appendix lists and maps the designated protected areas in Papua New Guinea.

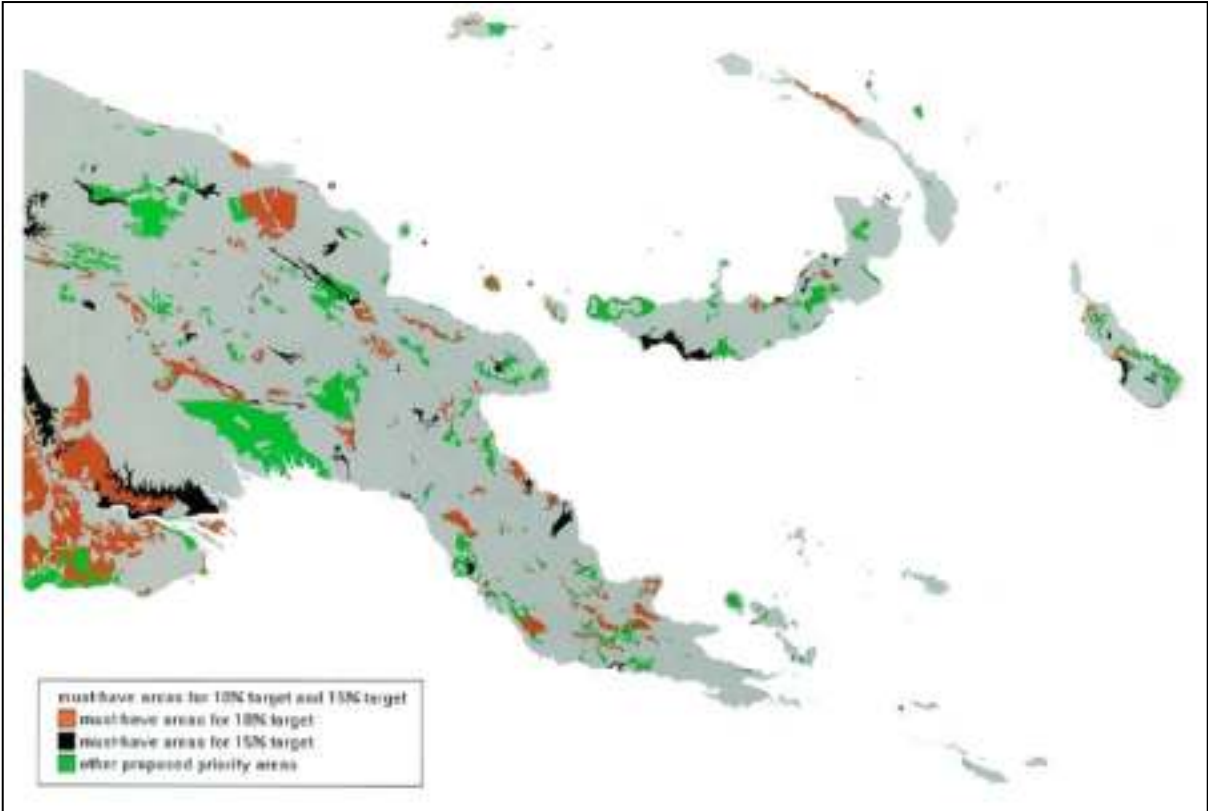
Table A Protected Areas in Papua New Guinea

Id	Name	Area (ha)	Id	Name	Area (ha)
1	Bagiai WMA	13,760.00	27	Mt Kaindi WMA	1,502.80
2	Baiyer River Sanctuary	64.00	28	Mt Susu National Reserve Park	49.00
3	Balek Wildlife Sanctuary	470.00	29	Mt Wilhelm National Reserve	817.00
4	Baniara Island Protected Area	37.28	30	Namanatabu Reserve	27.44
5	Cape Wom Memorial Park	2.00	31	Nanuk Island District Park	12.00
6	Crater Mountain WMA	270,000.00	32	Ndrolowa WMA	5,850.00
7	Crown Island Wildlife Sanctuary	58,969.00	33	Neiru (Aird Hills) WMA	3,984.00
8	Garu WMA	8,700.00	34	Nuraseng WMA	22.23
9	Hombareta WMA	130.00	35	Oi Mada Wara WMA	22,840.00
10	Hunstein Range WMA	220,000.00	36	Paga Hill National Park Scenic Reserve	17.44
11	Iomare WMA	3,827.50	37	Pirung WMA	43,200.00
12	Jimi Valley National Park	4,180.00	38	Pokili WMA	9,840.00
13	Kamiali WMA	65,541.00	39	Randa WMA	41,922.00
14	Kavakuna Caves	GAM	40	Randa Wildlife Sanctuary	15,724.00
15	Klampun WMA	5,200.00	41	Sawataetae WMA	700.00
16	Kokoda Historic Track Reserve	GAM	42	Siwi-Utame WMA	12,540.00
17	Kokoda Memorial Park	GAM	43	Talele Is. National Park Reserve	12.00
18	Lake Kutubu WMA	24,100.00	44	Tavalo WMA	2,000.00
19	Lake Lavu WMA	2,640.00	45	Tonda WMA	590,000.00
20	Linir Island Protected Area	20,207.85	46	Variarala Nat. Park	1,063.00
21	Loroko National Park	100.00	47	Wewak Peace Memorial Park	2.00
22	Maza WMA	184,230.00	48	Zo-oimaga WMA	1,510.00
23	McAdams National Park	1,821.00	49	Taab WMA	984.30
24	Moitaka Wildlife Sanctuary	44.00	50	Tabad WMA	16.20
25	Mojirau WMA	5,079.00	51	Sinub WMA	11.80
26	Mt Gahavisuka Provincial Park	77.40	52	Laugum WMA	72.95

Figure A Protected Areas of Papua New Guinea.



BIODIVERSITY PRIORITY AREAS OF PAPUA NEW GUINEA



APPENDIX 2 PROVINCIAL DEMOGRAPHIC PROFILES

This appendix lists data tables of provincial and district level data that apply to PACD.

1. Highlands Provinces

About 39% of the population live in the Highlands region. Its population primarily lives in remote and rural communities, with 37.5% of the people living below the poverty line (CARE 2018). Data for Jiwaka Province was not obtained.

Eastern Highlands Province		
Provincial Headquarters	Goroka	
Number of Districts	8	Daulo, Goroka, Henganofi, Kainatu, Lufa, Obura Wonenara, Okapa, Unggai Bena
Number of LLGs	24	
Number of Wards	261	
Population	432,972	51.5% (M), 48.5% (F)
Population density	38.8 persons per km ²	
Literacy rate	43.9%	51% (M), 36.5% (F)
Pop. within 5km of national road	45.4%	
Pop. with electricity	2%	
Households engaged in agriculture	Coffee	88.4% (with 85.4% for cash)
	Food crops	76.7% (with 11.9% for cash)
	Livestock	47.8% (with 4.9% for cash)
	Poultry	12.5% (with 4.4% for cash)

Enga Province		
Provincial Headquarters	Wabag	
Number of Districts	5	Kandep, Kompian-Ambum, Lagaip-Porgera, Wabag, Wapenamanda
Number of LLGs	15	
Number of Wards	334	
Population	295,032	51.9% (M), 48.1% (F)
Population density	25.2 persons per km ²	

Literacy rate	35%	40.2% (M), 29.5% (F)
Pop. within 5km of national road	62.5%	
Pop. with electricity	0.5%	
Households engaged in agriculture	Coffee	36.9% (with 34.4% for cash)
	Food crops	79.8% (with 9.3% for cash)
	Livestock	70.1% (with 8.5% for cash)
	Poultry	20.2% (with 9.4% for cash)

Simbu (Chimbu) Province

Provincial Headquarters	Kundiawa	
Number of Districts	6	Chuave, Gumine, Karimui Nomane, Kerowagi, Kundiawa, Sinasina Yonggamugl
Number of LLGs	20	
Number of Wards	308	
Population	259,703	52% (M), 48% (F)
Population density	42.5 persons per km ²	
Literacy rate	41.8%	48.7% (M), 34.5% (F)
Pop. within 5km of national road	72.3%	
Pop. with electricity	0.7%	
Households engaged in agriculture	Coffee	87.8% (with 85.3% for cash)
	Food crops	81.2% (with 7.9% for cash)
	Livestock	72.8% (with 4.9% for cash)
	Poultry	25.6% (with 5.9% for cash)

Southern Highlands Province¹²

Provincial Headquarters	Mendi	
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¹² Note: This data is from 2011 and included Hela Province.

Number of Districts	8	Ialibu Pangia, Imbonggu, Kagua Erave, Komo Margarima, Koroba Lake Kopiago, Mendi, Nipa Kutubu, Tari Port
Number of LLGs	32	
Number of Wards	729	
Population	546,265	
Population density	21.3 persons per km ²	
Literacy rate	36.5%	40.6% (M), 32.3% (F)
Pop. within 5km of national road	65.3%	
Pop. with electricity	0.3%	
Households engaged in agriculture	Coffee	50.3% (with 46.3% for cash)
	Food crops	78% (with 6.8% for cash)
	Livestock	62.2% (with 8.6% for cash)
	Poultry	15.4% (with 0.6% for cash)

Western Highlands Province

Provincial Headquarters	Mt. Hagen	
Number of Districts	7	Anglimp South Wahgi, Baiyer Mul, Dei, Hagen, Jimi, North Wahgi, Tambul Nebilyer
Number of LLGs	15	
Number of Wards	479	
Population	440,025	
Population density	48.4 persons per km ²	
Literacy rate	38.4%	44.1% (M), 32.6% (F)
Pop. within 5km of national road	73%	
Pop. with electricity	0.2%	
Households engaged in agriculture	Coffee	77% (with 74.8% for cash)
	Food crops	77.7% (with 13.2% for cash)

Livestock	63.6% (with 7% for cash)
Poultry	23.7% (with 11.1% for cash)

2. Coastal Provinces

Madang Province

Provincial Headquarters	Madang	
Number of Districts	6	Bogia, Madang, Middle Ramu, Rai Coast, Sumkar, Usino Bundi
Number of LLGs	19	
Number of Wards	451	
Population	365,106	
Population density	12.6 persons per km ²	
Literacy rate	55.2	61.2% (M), 48.8% (F)
Pop. within 5km of national road	36.3%	
Pop. with electricity	0.1%	
Households engaged in agriculture	Coconut	58.6% (with 31.4% for cash)
	Food crops	76.3% (with 13.3% for cash)
	Livestock	39.3% (with 5.2% for cash)
	Cocoa	39.7% (with 39% for cash)

Autonomous Region of Bougainville

Headquarters	Buka	
Number of Constituencies	11	Buka, Selau/Suir, Tinputz, Kunua, Wakunai, Torokina, Panguna, Bana, Siwai, Kieta, Buin
Number of LLGs/Wards	31	
Population	300,000 ¹³	51.4% (M), 48.6% (F)
Population density	18.7 persons per km ²	

¹³ ABG estimate based on 2011 census and growth rate.

Literacy rate	76.7%	78.4% (M), 75% (F)
Pop. within 5km of national road	41.1%	
Pop. with electricity	0.3%	
Households engaged in agriculture	Coconut	79.5% (with 43.7% for cash)
	Food crops	76.6% (with 14.3% for cash)
	Cocoa	71% (with 69.5% for cash)
	Poultry	55.8% (with 10.8% for cash)

East New Britain Province

Provincial Headquarters	Kokopo	
Number of Districts	4	Gazelle, Kokopo, Pomio, Rabaul
Number of LLGs	18	
Number of Wards	386	
Population	220,133	52.6% (M), 47.4% (F)
Population density	14.4% person per km ²	
Literacy rate	81.6%	82.4% (M), 80.7% (F)
Pop. within 5km of national road	61.3%	
Pop. with electricity	3%	
Households engaged in agriculture	Coconut	64% (with 49.6% for cash)
	Food crops	74.4% (with 25.7% for cash)
	Livestock	37.2% (with 14.7% for cash)
	Cocoa	60.4% (with 58.2% for cash)