

Introduction

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Agriculture is the most important activity carried out by the vast majority of Papua New Guineans. For most people, agriculture fills their lives, physically, culturally, economically, socially and nutritionally. Yet agriculture is the most undervalued and misunderstood part of PNG life (see Twenty myths about PNG agriculture, page 1). The reasons for this are partly because mineral and oil exports make PNG comparatively wealthy for a developing country; partly because agriculture is practised in the countryside, away from towns, and is therefore largely 'invisible' to urban people and international visitors; and partly because agriculture is viewed as not being 'modern'.

However, as this book shows, agriculture feeds most Papua New Guineans, houses them, provides a significant amount of food to townspeople and earns a significant amount of foreign exchange. By doing these things, agriculture provides PNG with a social, economic and political stability which has meant that, despite sometimes poor economic management, the country has been able to weather a number of economic and political crises. Furthermore, agriculture will continue in this role, long after all the minerals and oil have been dug up and exported.

The primary purpose of this book is to demonstrate how important agriculture is to PNG and to provide the knowledge that will enable policy makers to make sensible plans for it, within the PNG economy. For a developing country, PNG is rich in information for planning, but most of it is not easily accessible to those who need it. This book was initially conceived to bring this 'lost' information on PNG agriculture

together in a single publication where it would be easy to access. It began as a compendium of statistics but has evolved into a comprehensive book of 72 sections on PNG agriculture and related topics. The number of sections alone demonstrates how agriculture pervades almost every aspect of life in PNG.

Sections include information about population; land use; climate and other aspects of the physical environment in which agriculture occurs; overviews of subsistence food production, with detailed descriptions of production techniques and the most important food crops; descriptions of cash crop production for both domestic and export markets; agriculture in the broader economy; and a series of papers on agricultural development, policies and governance. An overview of 50 000 years of agricultural history in PNG follows this introduction.

An outstanding aspect of this book is the emphasis it places on village agriculture, the most important part of PNG agriculture. It provides details that have not been previously available on subsistence food production systems; on the informal sector that provides most of the marketed fresh food, betel nut, firewood, fish and other products; and on all of the major and minor cash crops, with new analyses and datasets, many of which contain data runs over 40 years long.

The book has a dual focus: food production and cash income. Almost every section relates to how people manage the environment, the production and the marketing of the commodities they produce. The book is dedicated to the village women, men and

children who are the skilled agriculturalists of PNG and who produce all of the fresh food in the country as well as most of the export cash crops and the domestic animals.

Agriculture in Papua New Guinea

Subsistence food production is the most important part of PNG agriculture. It provides most of the food consumed in the country – an estimated 83% of food energy and 76% of protein (Figure 2.1.1). Its importance only becomes apparent when a rare partial failure of food production occurs, as happened in the very severe drought and frosts of 1997 (Section 1.6). People's sustenance also comes from hundreds of food crops, husbandry of domestic animals, fish and locally produced sugar (Sections 2.6, 5.9, 5.10). This is supplemented by imported rice, wheat-based foods, some meat and some fish (Section 2.1).

Cash income is provided by sales of Arabica coffee, fresh food, cocoa, betel nut, copra, oil palm, firewood, tobacco, fish and many minor products including vanilla, rubber, balsa and tea (Section 5.1).

There is a long history of agriculture in what is now PNG, with the first settlers arriving about 50 000 years ago. Agriculture began in PNG at about the same time as it appeared in the Middle East and in China, about 10 000 years ago (see page 10). Some food plants were domesticated in New Guinea and others were introduced from Asia and other Pacific islands. In the 1700s, new crops began to reach PNG from the Americas and one, sweet potato, has become PNG's most important crop. Many new food and potential cash crops were introduced during the colonial period, from the early 1870s onwards. A feature of the long history of agriculture in PNG is the careful adoption of some new crops and the rejection of others. It is also characterised by innovations in the management of land including draining, fencing, tree planting, composting, soil erosion control and mounding. Many of these changes have been associated with the intensification of land use, in which more food is produced from the same area of land (Sections 3.6 to 3.12).

Influences of global trends in 2007–2008

Evidence is building that fundamental worldwide changes are occurring that go beyond global climate change, and which will pose multiple challenges for agriculture everywhere. Land once used to grow food is growing biofuels; the demand for many products has increased as the economies of China and other rapidly developing nations grow; agricultural land is being lost to urbanisation and industrialisation; fertilisers and herbicides are becoming more expensive; surface water is being reduced in many locations; soil nutrients are being lost; pest and disease problems are increasing; a neglect of agricultural research is reducing technological solutions; marine harvests are declining; and prolonged droughts exist in a number of countries, possibly associated with global climate change. As a result, the prices of rice, wheat, corn (maize), vegetable oil, dairy products, meat and fish have all increased markedly in 2007–2008.

These global changes pose challenges for PNG agriculture producers and consumers, including much higher prices for imported foods. At present the PNG economy is benefiting from these changes because prices of agricultural commodities that are linked to crude oil have risen sharply in recent years, including palm oil, copra oil and natural rubber. The use of fertilisers and herbicides in PNG agriculture continues to be negligible, with most villagers using little or no inputs into production other than their land and their labour (Section 5.19).

The increase in exports of marine products, mainly tuna (Figure 5.9.2), round logs (Figure 5.8.3) and palm oil from PNG (Figure 5.7.4) is the outcome of higher global demand. The changing global economy is reflected in the greater proportion of logs and balsa from PNG exported to China and other emerging economies in Asia (Figures 5.8.4, 5.13.2).

As this book goes to press in late 2008, global financial markets are in turmoil. This is likely to have far-reaching consequences for the global economy, but much remains unknown. Papua New Guinea rural producers will be affected by these changes, but will be largely sheltered by subsistence food production and their limited dependence on external inputs.

Strengths of PNG agriculture

PNG agriculture has many strengths. Firstly, by providing most of the food consumed within PNG, it imparts great stability to the nation. Agriculture is also the main source of cash income for a great majority of people. People use money to better their lives, including supplementing protein-poor diets, building better houses, educating their children and accessing medical services. Most rural people are employed as producers, processors or intermediate traders in agriculture. As well, there are vigorous informal businesses where people grow, transport, trade and retail fresh food, betel nut, firewood, fish and other commodities (Sections 5.1, 5.17). Agriculture also provides 17% of PNG's exports by value (Figure 5.2.1).

Agriculture is a major contributor to development within PNG. A vibrant cash crop component exists in both the formal and informal sectors, in almost all of the more-developed locations. In contrast, the least-developed parts of PNG, where most people are poor, are characterised by subsistence food production only.

A number of environmental factors severely constrain agriculture in PNG, including excessively high rainfall, steep slopes, inundated land and extensive cloud cover. Villagers have a detailed understanding of the relationship between crops and the environment (Section 1.13). More important than a good physical environment, however, is the energy, drive and adaptability of the people in more than one million rural households. They respond to new opportunities, including higher prices and better returns to their labour (Section 5.20). They form the core of what is a largely unrecognised significant private sector group.

Other parts of the private sector consist of people involved in trading and processing commodities for the domestic and export markets. Thousands of people are involved in trading and transporting betel nut alone, as it is moved from lowland locations to the highlands, where it does not grow, and to urban centres and mines. A few small companies participate in the formal economy, trading and processing

produce. A number of large firms grow, buy, process and export oil palm, sugar cane, coffee, cocoa, copra, rubber and tea.

Villagers are often portrayed as unresponsive to price or market messages. The devaluation of the PNG currency in the late 1990s (Figure 4.1.1) is a clear demonstration that this is false. Large increases in the prices for many goods as measured by the consumer price index occurred in the late 1990s (Figure 4.2.1), including imported rice (Figure 4.3.3) which, in turn, led to an increase in the price of marketed sweet potato (Figure 4.3.1). This was also a time of low returns for coffee in the highlands (Figure 5.4.3). Many highlanders responded to the increased price for sweet potato and the reduced price of coffee by growing more sweet potato for sale in urban markets. The increase in production resulted in lower prices for consumers, so that sweet potato became more competitive compared with imported rice, leading to increased consumption of sweet potato. A similar response is occurring in 2008 following rapid increases in the price of rice and other imported foods.

Another strength of PNG agriculture is the customary land tenure system (Section 6.1). Individuals and companies who wish to access large areas of land for agricultural development can be frustrated by customary tenure, but the system is sufficiently flexible to accommodate increasing population and internal migration (Sections 1.1, 1.3, 1.4). It has been argued that economic development will not occur unless all land is privatised and registered to individuals, but individual titles to land on settlement schemes has often resulted in poor economic outcomes (Section 6.7). Nor has the holding of a title helped the plantation sector, where production of all export cash crops except oil palm has declined over the past 30 years (Table 5.2.1; Figures 5.4.4, 5.5.2, 5.7.5, 5.11.3). PNG does not have the administrative capacity to survey customary land, identify customary owners, settle the myriad disputes that would result, and issue titles, let alone record the thousands of changes of ownership that will occur. Only where uncertainties in tenure are causing real problems, such as in the peri-urban areas of the larger towns, should attempts be made to interfere with customary tenure.

Marketing systems for oil palm, coffee, cocoa and copra are efficient and return to growers a reasonable share of the international market price (Section 5.21). Marketing systems are less efficient for vanilla and most domestically marketed produce, particularly fresh food (Sections 5.3, 5.14).

Challenges and constraints

This book identifies a number of significant challenges and constraints which presently limit the potential of agriculture in PNG. If the sector is to achieve its full potential, these will need to be addressed by the PNG Government and private sector, supported by international donors. The major constraints are:

- Pressure on land associated with rapid population growth, particularly in parts of the highlands and on small islands (Section 1.3). This is affecting soil fertility and the ability to grow food.
- Poorly maintained transport infrastructure, particularly roads and bridges (Section 6.9).
- Limited new technology being generated from research. Some commodities, particularly palm oil and sugar cane, are supported by excellent research, but most commodities are not adequately supported, including subsistence and marketed fresh food. Research is frequently focused on a crop, rather than the agricultural system of which it is a part.
- Research capacity directed at commodities that have little or no chance of expanding or being adopted, including rice, wheat and pulses.
- Very limited effective outreach and agriculture extension capacity. Despite the availability of a moderately large body of information which would advantage producers, little of this is effectively communicated to them.
- Climate change as a significant long-term challenge, particularly rising sea levels, greater rainfall, increasing temperatures and possibly greater frequency of extreme climatic events (Section 1.8).

- Mismanagement of the national economy, poor performance of institutions involved in the governance and administration of agriculture, and poor policy making. This includes policies that result in distortions of the terms of trade and large movements in the currency exchange rate (Sections 4.1, 6.3, 6.4).
- Insufficient involvement of women in some aspects of agriculture, particularly trading (Section 6.2).
- An HIV/AIDS epidemic, which will severely affect agricultural labour supply in some places (Section 1.1).
- Inadequate security for people and property.
- Insufficient access to credit for intermediate traders.
- Inadequate attention to quality control for some commodities, particularly coffee, fresh food and vanilla.
- Poor communication among growers, middlemen, processors and retailers in the production and marketing chain.
- Insufficient attention given to marketing and promotion of PNG produce.
- Severe poverty for about a sixth of the population, which limits their ability to participate in the formal economy (Section 6.10).

Future focus for research and development

The greatest returns to investment in PNG agriculture will come from research and development in the following components of PNG agriculture:

- Subsistence food production, particularly sweet potato; agricultural system management; soil fertility maintenance; and pest and disease management (Part 3).
- Domestic marketing of food, particularly root crops and certain fruit, including mandarin, mango, mangosteen and rambutan (Section 3.3).

- Major export tree crops of coffee, cocoa, copra and oil palm (Sections 5.4, 5.5, 5.6, 5.7).
- Minor export crops of rubber, balsa and certain spices (Sections 5.11, 5.13, 5.14, 5.15).
- Fuelwood and hardwood timber species, grown in plantations or in village plots (Section 5.8).
- Edible nuts for domestic and export markets, notably *galip*, *karuka*, *okari*, *pao* and sea almond (Section 3.4).
- Domesticated animals, particularly pigs, chickens, cattle and goats (Section 2.6).

Currently there is investment or interest in a number of new uses for cash crops. For export these include biofuel from cassava, jatropha, castor, corn and coconut; bamboo for edible shoots and timber; sago starch; sandalwood; kava; cashew nuts; and organically certified essential oils from spice plants. Village plots of timber for fuelwood, construction, pulp and hardwood; peanuts; *galip* nuts; noni; and prawn farming are being investigated for both the domestic market and for export. Cut flowers could be grown for the domestic market.

Many of these have good potential. Success will depend on a number of factors, particularly markets, prices and returns to labour or capital investment as well as the removal of at least some of the constraints listed above.

There are proposals for the development of a number of other agricultural commodities, including fresh food for export; processing food for the domestic market; and local production of rice, wheat and pulses to replace imports. We believe that poor returns and other limiting factors mean that these proposals have little or no realistic chance of success. This assessment is based not only on returns to labour and capital investment, but also on a long history of past failures.

Agriculture in PNG has a long and dynamic history in which the outstanding feature has been the willingness of villagers to adopt new crops and to change technologies. Changes in staple foods (Figure 3.1.2) and export cash crops (Figure 5.2.3) over time demonstrate this willingness. Many exciting new possibilities exist for further development of food and cash crops in PNG, but it is important to learn from the past and trust the judgements of village producers. Their willingness to change and develop in the past must be placed alongside their refusal to adopt crops and ideas for which they can see no future. Much of the information in this book was gathered from villagers in every district in PNG. Their knowledge and their needs must be acknowledged if PNG agriculture is to continue to grow.