

15. SOCIO-ECONOMIC ENVIRONMENT: UPSTREAM FACILITIES AND PIPELINES	15-1
15.1 Introduction	15-1
15.2 Methods and Sources of Information	15-1
15.3 Upstream Project Impact Area	15-5
15.4 Study Area Cultural Groups	15-7
15.5 Social Organisation	15-8
15.5.1 Clans and Leadership	15-12
15.5.2 Representative Community Organisations	15-13
15.5.3 Non-government Organisations	15-14
15.6 Health	15-14
15.6.1 Infrastructure and Service Delivery	15-14
15.6.2 Principal Health Challenges in the Upstream Project Impact Area	15-15
15.6.3 Morbidity and Mortality Profiles in the Upstream Project Impact Area	15-16
15.6.4 Disease Control Issues	15-18
15.6.4.1 Tuberculosis	15-18
15.6.4.2 Malaria	15-18
15.6.4.3 Sexually Transmitted Diseases	15-19
15.7 Education	15-20
15.7.1 School System	15-22
15.7.2 Educational Level and Enrolment	15-22
15.8 Agriculture, Fishing and Hunting	15-29
15.8.1 Agriculture	15-29
15.8.2 Fishing	15-31
15.8.3 Forestry	15-31
15.8.4 Commercial Activities	15-31
15.8.5 Markets	15-32
15.8.6 Resettlement	15-34
15.9 Transportation and Communication	15-34
15.9.1 Roads	15-34
15.9.2 Air Services	15-36
15.9.3 Communications	15-36
15.10 Upstream Project Impact Area Economic Activity	15-36
15.10.1 Local Businesses	15-36
15.10.2 Personal Income	15-37
15.11 Government	15-38
15.11.1 National Government	15-38
15.11.2 Provincial Government	15-42
15.11.3 Local-level Governments	15-42
15.12 Oil and Gas Governance	15-44
15.12.1 Expenditure Implementation Committee	15-45
15.12.2 Benefits Sharing Agreement	15-45
15.13 Gender and Women's Issues	15-46

Figures

15.1	Territory of the ethnic groups within the upstream project impact area	15-9
15.2	Population estimate of ethnic groups within the upstream project impact area	15-10
15.3	Distribution of health facilities in the upstream project impact area	15-17
15.4	Reported HIV and AIDS infection cases in Papua New Guinea	15-21
15.5	PNG education system	15-23
15.6	Project impact area higher education profiles	15-26
15.7	Distribution of educational institutions across the upstream project impact area	15-27
15.8	Illiteracy rates identified in the project impact area from 2005 to 2008	15-28
15.9	Comparison 2005 and 2007 tertiary sponsorship by gender	15-30
15.10	PIA perceptions of decline in hunted species	15-33
15.11	Travel profiles 2005 to 2008	15-35
15.12	Expenditure patterns SIA 1998, 2001 and 2005	15-39
15.13	Expenditure patterns: greenfield and brownfield comparisons	15-40
15.14	Comparative trade store purchases SIA 2001 and 2005	15-41
15.15	Provincial and local-level government structure	15-43

Tables

Table 15.1	Studies undertaken in the upstream project impact area during 2005 to 2008	15-2
Table 15.2	Principal causes of morbidity and mortality in the project impact area	15-16
Table 15.3	Outpatient ailments in Juha (PRL-2) area	15-19
Table 15.4	School systems before the 1991 education reform	15-22
Table 15.5	Formal education and literacy levels	15-22
Table 15.6	University of Papua New Guinea Waigani campus 2006/07 enrolment statistics	15-24
Table 15.7	Tertiary education sponsorship 2007	15-25
Table 15.8	Average livestock per household	15-32
Table 15.9	Proportion (%) of households surveyed reporting specific income sources	15-37
Table 15.10	Local-level government status in Southern Highlands and Gulf province project areas	15-44
Table 15.11	Beneficiaries and benefit stream flows	15-44
Table 15.12	Huli women's associations	15-47

Plates

15.1	Longhouse at Siabi showing 'menstrual confinement' structure	15-11
15.2	The late Kula from Gesesu; an eminent and widely known curer	15-11
15.3	Collecting mud crabs at Goaribari Island	15-11

15. SOCIO-ECONOMIC ENVIRONMENT: UPSTREAM FACILITIES AND PIPELINES

15.1 Introduction

This chapter provides an overview of the upstream socio-economic environment based on the social impact assessment (SIA), which is provided as Appendix 26, Social Impact Assessment. It begins with the methods and sources of information used to prepare the SIA (Section 15.2, Methods and Sources of Information), the ethno-linguistic groups that inhabit the upstream project impact area (Sections 15.3 to 15.5), the status of social sector infrastructure, e.g., health, education, subsistence activities and resettlement, communications, transport, local business and types of corporate and personal income streams (Sections 15.6 to 15.11). This chapter concludes with consideration of the nested levels of provincial and local government with operational responsibility for project area landowners and services (Sections 15.11 and 15.12), and an indication of gender issues in the upstream environs (Section 15.13, Gender and Women's Issues). The social infrastructure, government and governance aspects are described in the context of Papua New Guinea generally, and this broader national context is also relevant to the socio-economic environment of the LNG Facilities site described in Chapter 17, Socio-economic Environment: LNG Facilities.

The PNG LNG Project environs are inhabited by 'indigenous peoples'. These ethnic groups do not form minorities distinct from some dominant society in Papua New Guinea and which therefore constitutes them as vulnerable or disadvantaged in the development process. They rely primarily on subsistence-oriented production, maintain a close physical and spiritual relationship to ancestral territories, self-identify as distinct linguo-cultural groups, and retain customary, social and political institutions.

Esso will develop an indigenous peoples development plan, called a National Content Plan, that will encompass its voluntary social action plans for the sector areas of training, health, agriculture, business development and education. This National Content Plan will address many of the identified impacts and sustainable development opportunities (see Chapter 23, Project-wide Socio-economic and Cultural Impacts and Mitigation Measures) discussed within the SIA (Appendix 26, Social Impact Assessment).

15.2 Methods and Sources of Information

The SIA research methodology followed PNG and international guidelines. It relied on the pertinent social mapping and landowner identification reports conducted under s. 47 of the *Oil and Gas Act 1998* and the *Oil and Gas (Amendment) Act of 2001*, and commissioned by the proponent for both the PNG Gas and PNG LNG projects. Studies undertaken in the period 2005 to 2008 are described in the SIA and listed below in Table 15.1.

Table 15.1 Studies undertaken in the upstream project impact area during 2005 to 2008

Research Study/Report*	Date	Scope*
Upstream Archaeology and Cultural Heritage Studies/Reports		
Archaeological research: Hides to Goaribari (Omati River Landfall), Juha, Komo, Kopi and Homa pipeline deviation routes	2005 to 2008	See Chapter 14, Cultural Heritage Environment: Upstream Facilities and Pipelines.
Upstream Household and Village Surveys		
Brownfield areas: Hides to Goaribari (Omati River Landfall)	2005	SIA household and village surveys were conducted and a total of 1,774 households (comprising 78% males and 22% females) were surveyed. This covered some 43% of catchment households and 82 national census units in the region. In addition 82 village surveys covering 80% of the census units in the project area were conducted.
Greenfield areas: Juha and Komo	2007 to 2008	SIA household and village surveys were conducted including: <ul style="list-style-type: none"> • Komo – 123 households (comprising 66% males, 34% females) covering 39% of catchment households and three national census units. • Juha – 38 households (comprising 92% males, 8% females) covering 76% of catchment households and four national census units. In addition to the household surveys, village surveys were conducted at Komo over three census units and also at Juha where four villages were surveyed.
Supplementary brownfield survey Hides to Goaribari (Omati River Landfall)	2007 to 2008	SIA household and village surveys were conducted to reassess community attitudes from Hides to Goaribari to the changed project prospectus (from the PNG Gas Project to the PNG LNG Project) in respect to support, understanding, perceived benefits and disadvantages. A total of 2,443 individuals (comprising 65% males and 35% females), i.e., approximately 10% of the brownfield population were interviewed. This covered the views of local people across 76 national census units (i.e., 71% of the census units in the area).
Upstream Social Reports		
PNG Gas Project Hides to Goaribari (Omati River Landfall) SIA	2005	Household and village surveys documented over 11,000 individuals (i.e., approximately 45% of the known population in the project impact area) as part of the PNG Gas Project EIS.
Upstream Health Impact Assessment	2008	The Health Impact Assessment included a detailed and rigorous review of the substantial health-related databases available. This included government reports for the period between 1990 and 2007, international aid monographs, (e.g., AusAID), publications by the PNG Institute for Medical Research (PNG-IMR), peer-reviewed published scientific/medical articles and unpublished data available from the extensive Oil Search Limited community outreach and medical department activities.

**Table 15.1 Studies undertaken in the upstream project impact area during 2005 to 2008
(cont'd)**

Research Study/Report*	Date	Scope*
<i>Full-scale Social Mapping and Landowner Identification (SMLI)</i>		
Hides to PDL-5 PNG Gas Pipeline Route	2006	<p>SMLI fieldwork and report for PNG Gas Project on areas between Hides PDL-1 and Moran PDL-5 (see Chapter 8, Legal, Administrative and Planning Framework).</p> <p>The terms of reference included:</p> <ul style="list-style-type: none"> • To provide a detailed description of the clan structure, migration history, provenance and present organisation of people within a 10-km buffer zone of a proposed pipeline route (5 km on either side of the pipeline). • To provide a preliminary distribution map showing the relative positions of major clans in the area, i.e., a 'group to ground' grid. • To provide skeletal genealogies for the principal landholding groups indicating sub-clan and lineage branch structures. • Report on any issues – sacred sites, burial grounds, and archaeological formations – that may impact on any future work. • Provide a summary of current and projected land disputes within the target area and identify any 'trigger issues' in the community. • Provide a set of recommendations in respect to the PNG Gas Project and issues of (a) benefit distribution mechanisms; (b) identification, accreditation mechanisms for project area beneficiaries of project cash benefits.
Kutubu PDL-2	2005	<p>SMLI fieldwork and report for PNG Gas Project on Kutubu PDL-2 area.</p> <p>Terms of reference – as above.</p>
Kantobo to Kaiam	2005	<p>SMLI fieldwork and report for PNG Gas Project on pipeline route between Kantobo and Kaiam.</p> <p>Terms of reference – as above.</p>
Kaiam to Goaribari (Omati River Landfall)	2005	<p>SMLI fieldwork and report for PNG Gas Project on Kaiam to Goaribari (Omati) pipeline route.</p> <p>Terms of reference – as above.</p>
Juha PRL-2	2008	<p>SMLI fieldwork and report for PNG LNG Project on Juha Febi people in PRL-2. The report anticipated an application by Esso for a PDL licence.</p> <p>The terms of reference for this SMLI were developed with endorsement by DPE and were defined as follows:</p> <ul style="list-style-type: none"> • Research Overview: To provide a review of relevant research concerning the licence area and landowners under investigation, i.e., history of contact, anthropological investigations, regional connections and brief identification of province, district, local-level government and ward level identification. • Social-Cultural Context: Detail of who the ethnic groups are in the licence area (e.g., Huli, Febi etc.), talk about the regional context (highlands, lowlands, coastal etc.), linguistic situation (languages spoken), history of settlement and migration, pre- and post-contact history.

**Table 15.1 Studies undertaken in the upstream project impact area during 2005 to 2008
(cont'd)**

Research Study/Report*	Date	Scope*
<i>Full-scale Social Mapping and Landowner Identification (SMLI) (cont'd)</i>		
Juha PRL-2 (cont'd)	2008	<ul style="list-style-type: none"> • Social Organisation: To provide a description of the clan structure, migration history, provenance and present organisation of people within the target areas. This is to include social structure/group formation (e.g., clan structure), gender, marriage, trade and exchange, warfare, and inter-tribal relations, and modes of settlement (e.g., village, household, hamlet) should be addressed. These considerations to include principles of group formation (kinship and descent), leadership, identity and genealogies. Sample genealogies of the main impacted groups should be collected. Some mention of customary dynamics of group formation and change, i.e., how and when new groups are formed, are to be included. • Mapping Results/Findings: To provide a preliminary distribution map showing the relative positions of major groupings such as clans in the area – a 'group to ground' grid – with an understanding of applicable land tenure principles and concepts. • Ecology, Subsistence, Landscape and Settlement: To provide an understanding of the subsistence and economic systems of the licence area landowners. This should detail modes of subsistence (e.g., fishing, agriculture) and use of physical environment, customary concepts of 'residence', 'ownership', 'use', 'compensation' and the principles which govern claims to all forms of resource ownership (i.e., land, trees, water, hunting areas etc.). Any present land disputes likely to impact project should be explained and some consideration given to the nature of what might be regarded as sacred sites and other forms of cultural heritage. • Forms of Community Representation: Provide a summary indication of present representation systems in the target licence area. This should detail customary, community and introduced forms of representation (political leadership, landowner companies, incorporated land groups, local-level governments, wards etc.) types of disputes and resolution mechanisms (moots, village courts, local/district/supreme court structures), religious, gender-based and recreational organisations and their distribution. • Significant Social Issues and Recommendations: To provide an overview of any significant social issues that may need to be addressed in the licence area to include relations between landholders/landowners and government and or developer. • Bibliography: To provide a brief indication of key references used or relevant to the area under consideration.
Juha to Hides pipeline route	2008	SMLI fieldwork and report for PNG LNG Project on Juha to Hides pipeline route. Terms of reference – as above.
PDL application for PRL-12	2008	SMLI fieldwork and report for PNG LNG Project on PRL-12 licence area in anticipation of a PDL application. Terms of reference – as above.
PDL application for PRL-11	2008	SMLI fieldwork and report for PNG LNG Project on parts of present PRL-11 licence area in anticipation of a PDL application. Terms of reference – as above.

Table 15.1 Studies undertaken in the upstream project impact area during 2005 to 2008 (cont'd)

Research Study/Report*	Date	Scope*
Full-scale Social Mapping and Landowner Identification (SMLI) (cont'd)		
Hides PDL-1	2008	SMLI fieldwork and report for PNG LNG Project on Hides PDL-1 area. Purpose of report to update DPE on contemporary Hides landowner situation and outstanding grievances of PDL-1 clans not in receipt of existing Hides Gas to Electricity Project benefits. Terms of reference – as above.
Kopi pipeline deviation route	2008	SMLI fieldwork and report on the LNG Project Gas Pipeline deviation from Kaiam towards Omati. Terms of reference – as above.
Homa to Benaria pipeline deviation route	2008	SMLI fieldwork and report on the LNG Project Gas Pipeline deviation from Homa PDL-5 to Benaria. Terms of reference – as above.

* For explanation and location of the various pipeline licences, refer to Figure 8.3.

To reflect longevity of exposure to development projects, cultural homogeneity and/or co-residence, the upstream project impact area census units were aggregated into seven regional project catchment areas of Hides, Moran, Kutubu, Gobe, Kikori (brownfield catchments encompassing the existing development footprint from Hides to Omati), and Komo and Juha (greenfield catchments, i.e., the new additional areas that will be part of the proposed PNG LNG Project and which to date are not within petroleum or gas development fields). This analytical tool allowed the SIA to make longitudinal findings by comparing baseline survey data collected in 2007 and 2008 with previous data obtained in the period 1997 to 2005.

15.3 Upstream Project Impact Area

Papua New Guinea is divided into provinces that are in turn constituted by districts, wards and census units. For the purposes of the SIA assessment, the upstream project impact area, that is, the people and places likely to be immediately and directly and/or indirectly impacted by the project and its associated benefit streams, is defined as inclusive of 113 census units with an approximate population of 26,000.

The 113 census units include many project area landowners. The Oil and Gas Act defines project area landowners as persons 'who have customary rights of ownership of, or registered title within, petroleum development licences (PDLs) or within the 5-km buffer zone inside or around project facilities, such as plant sites and pipelines'.

The upstream project impact area is located within the Southern Highlands, Western and Gulf provinces (see Figure 2.1).

The Southern Highlands Province occupies 25,700 km² in the central west of Papua New Guinea and, in 2000, had a population of 546,000, with 451,000 (or about 11% of the national rural population) living in rural areas. The provincial growth rate since 1990 has been approximately 5.4%, making it one of the fastest growing provinces in Papua New Guinea. Population densities range from 190 persons/km² in the Tari basin, to 40 persons/km² around Lake Kutubu, and less than 20 persons/km² in the western part of the Komo–Margarima district.

More than half of the province is unoccupied. Politically, the province divides into the Koroba–Tari–Margarima area in the west, the Nipa–Mendi area in the centre, and the Ialibu–Kagua area in the east.

The greenfield area of Komo is a small settlement on the highlands fringe. It was established as an early patrol post during the mid 1960s. Intense tribal fighting during 2004 to 2005 resulted in most of the population fleeing both northwards to the Hides area, and southwards to Mananda villages. The airstrip at Komo has now been re-fenced but has not been used for flights for at least a decade and would require a major upgrade. There are new district offices in Komo. The Unincorporated Joint Venture of Mananda has put in some small-scale infrastructure, but the population actually resident in Komo remains well down on previous years. The people themselves feel that past inhabitants are slowly returning and, should the projected Komo airstrip be built, the resultant ancillary infrastructure development will increase the rate of return.

Income is generally very low except for those landowners receiving resource royalties and dividends. Agriculture is mainly sweet potato, supplemented by bananas, taro and pig husbandry.

The Western Province occupies 97,000 km². It is the largest province in the country and forms part of the international border with Indonesia. It has the three districts of Middle Fly, North Fly and South Fly and the mining towns of Tabubil and Kiunga. The estimated rural population in 2000 was 106,000, which is 3% of the national rural population. Population densities are low and are less than 10 persons/km² in the Middle Fly. Sago is the most important subsistence crop, supplemented by mixed staple cultivation of yam gardens, hunting and fishing.

The greenfield Juha wells, facility and pipelines will be developed within PRL-2 (see Figure 8.3), which straddles the Western and Southern Highlands provinces. Of the licence area, 93% is within the Middle Fly District, with the balance located in the Southern Highlands Province. At 1.8 persons/km², the population density is very low and the total population of the PRL-02 licence area is unlikely to exceed 400. There is very little cash income in this area. Much of the Juha Febi population has dispersed south to Suabi or north to Koroba to take advantage of health and education services.

The Gulf Province occupies some 13,500 km² on the south coast of mainland Papua New Guinea, where the estuaries of six major rivers converge into one large, prograding delta of islands, swamps and channels. The Gulf Province has the two districts of Kerema and Kikori, their eponymous towns and an estimated population in 2000 of 107,000, which is approximately 2% of the national rural population. Population densities range from 25 to 35 persons/km² to less than 10 persons/km², with most of the province west of Kerema unoccupied apart from small, scattered settlements along rivers and coast. Outboard motor boat and canoe are the major forms of transport around river areas.

The Gulf Province is a relatively poor province even by PNG standards, with cash income limited to minor sales of fish, betel nut and coffee. Royalties and dividends from oil and logging are the major sources of non-agricultural income in the area. In the lowlands, people rely on sago, supplemented by mixed staple gardens and pig husbandry, with fish and crabs around Kikori.

The history of contact in the upstream environs occurred in three distinct phases:

1. An early colonial phase between about 1900 and 1945.
2. A late colonial and pre-independence phase between 1945 and 1975.
3. A post-independence phase dating from 1975 to the present.

Missionaries, and then the gradual establishment of district posts and governance institutions followed early exploration and government patrols.

Notwithstanding various resource developments in the region for much of the last two decades, the majority of the host communities continue to subsist by traditional horticulture, pig husbandry, forestry and fishing. Some 97% of land in Papua New Guinea remains under customary tenure, and is subject to a portfolio of interests by corporate entities that are usually clan or sub-clan groups. In simple terms, while individuals are landholders, title rests with groups in perpetuity; land cannot be alienated without permission of such descent units, and any activities on the land require the consent of both landholders and landowners.

This customary land ownership – and both men and women are landowners – is perhaps the single most important feature of PNG society. Few social, economic or developmental issues can be described or assessed without reference to the complex portfolio of rights to land that defines both social identity, group membership, and access to resources such as forest, power and ritual status. The local cash economy is small, and the customary systems of exchange, bride-wealth and barter underpin the slowly evolving transition to modernity.

15.4 Study Area Cultural Groups

The ethnic groups of the upstream PNG LNG Project impact area are:

- Fasu of the western and southeastern fringes of Lake Kutubu down to Tamidigi, and who claim land on both the eastern and western borders of the Hegigio/Tagari River.
- Huli of the areas northwest from Yalenda through Baguale–Homa–Paua–Yarale–Tari–Koroba, and to the west of the Hegegio/Tagari River from south Komo through to Nogoli–Yaluba–Mogora–Pugua, Lebani and Tanggi.
- Onabasulu of the land west of the Hegigio River on the eastern edge of the Great Papuan Plateau and part of a group of the Strickland–Bosavi Region cultures.
- Foi of the northeastern fringes of Lake Kutubu, extending along the Pimaga to Poroma Road.
- Samberigi peoples of Sau, Kewa and Polopa inhabiting the northern Gobe area.
- Kikori congeries of peoples: the Kairi (Rumu) of Kopi and Ogomabu; the Ikobi (Kasere, Omati, Ikobi Kairi) of the Omati River; the Porome (Kibiri) of Veiru Creek, and the villages of Doibo, Veiru and Babaio, and the Kerewo of the Omati River – originally from Goaribari Island and divided into two distinct groups known as Pai'a (located in Bisi) and Otoia Kerewo (located at Goare, Dopima, Kemei, Mubagoa, Aidio, Samoa, Babaguina and Do'humo).
- Febi (or Agala and/or Tsinali), part of the Bosavi language family, including Konai, Febi and Kubo people. Febi territory runs from north of the Carrington (Asio or Osio) River to beyond the southern PRL-2 border.

Figure 15.1 illustrates territory of the different ethnic groups and Figure 15.2 provides an estimation of population.

Precolonial intertribal trade was well established across even this broad and difficult terrain. These co-dependent links mean that existing and prospective resource projects are not creating new paths, opening new social horizons or juxtaposing peoples previously unknown to each other. Rather, they are redefining, retracing and reworking old customary networks.

With trade came intermarriage and migration. Many of the clans in the Febi, Huli and Kutubu areas trace oral history links to each other's land. Similarly, over the last century there has been considerable migration north from the lower reaches of the Omati River to the Kikori River environs.

The almost two decades of resource development has increased these patterns of trade and intercourse between local ethnic groups. However, the sheer numerical size of the Huli (some 150,000 speakers) group, coupled with a steadfast territorial colonisation of marginal uninhabited areas, has meant that Huli is fast becoming the lingua franca of the region. This has manifested as not just an increase in bilingualism, but the partial supplanting of Onabasulu, Febi and Fasu language by Huli.

15.5 Social Organisation

Residence patterns vary widely. The Huli tend to settle in scattered homesteads. The people from Kutubu to Omati reside in villages often with central longhouses (Plate 15.1). The Febi do both.

There are major differences in social organisation between all these cultures but some principles appear common. The culturally ideal mode of descent reckoning is what is commonly referred to as patrilineal (or agnatic) descent, i.e., tracing a consanguineal link to ancestors through an unbroken line of males. The extent to which cultures in the project impact area place a premium on remembering and encoding genealogies seems to correlate with the extent to which their rights in any territory were customarily secured through verbal argument about oral history. The Huli, for example, have genealogies that typically have a generational depth of between 12 to 26 generations. By contrast, all evidence from the Juha–Kutubu–Samberigi–Kikori–Strickland–Bosavi clans is that few people relate back more than four generations because this mode of land title evidence or justification process was not utilised in the past. The Huli perceive that their long genealogies give them an advantage in disputes about land ownership because they can claim tenurial precedence by past ancestors.

The implications of the relationship principles of agnatic descent and bilateral kinship differ by area. The project impact area presents a complex set of corporate group memberships wherein the same individuals may represent themselves as members of several land-claiming units based on varying principles of identity and their association with a portfolio of land rights and responsibilities.

Figure

15.1 Territory of the ethnic groups within the upstream project impact area

Figure

15.2 Population estimate of ethnic groups within the upstream project impact area

Plate

- 15.1 Longhouse at Siabi showing 'menstrual confinement' structure**
- 15.2 The late Kula from Gesesu; an eminent and widely known curer**
- 15.3 Collecting mud crabs at Goaribari Island**

15.5.1 Clans and Leadership

The Febi have approximately 12 patrilineal clans with very shallow genealogies of not more than four or five generations. These clans are not exogamous, i.e., there is no rule prohibiting marriage within the clan and the principle of patrilineal descent is modified by siblingship (especially brother–brother and brother–sister relationships). The ‘exchange’ of sisters is the most common form of marriage in the region.

The structure of the clan usually involves a mythical ancestor who produces a mythical pair of creatures, spirits or landscape features. Each of these in turn produces an ancestor of a sub-clan. Sub-clans are exogamous but potentially ephemeral given their small size. The heads of sub-clans of a clan are frequently sets of true brothers.

Febi leadership is based initially on a ‘hierarchy of virtue’. Men traditionally achieved authority in two ways: firstly, through being intelligent, persuasive and good at organising, and second by being a spirit medium and curer (Plate 15.2) whose opinions were sought in times of crisis and in dealing with new outsiders.

Fasu are subdivided into more than 72 clans residing in 13 villages. Fasu clans, like their Huli counterparts, are often represented in more than one village and, because of their small size, are prone to erratic population fluctuations. The clans themselves are totemic in the sense of recognising descent from some animal or plant species. Fasu social organisation is based on patrilineal descent principles with sub-clans having headmen as corporate representatives.

Huli social organisation is based on named clans, some of which recognise common descent, with each clan associated with a distinct territory commonly referred to as a ‘parish’. These parishes define a locus of tenurial, property, religious and social interests. There are between 300 and 400 named clans in Huli, but the system does not present as a simple ‘one clan, one piece of land’ model. It is permissible for people to travel, occupy, stay and utilise gardens in other clan parishes to which they can trace some kinship or descent affiliation. In essence, there is a high tolerance of multi-residence, such that members and segments of any one named clan are invariably spread across huge distances on Huli territory. Each clan or clan segment has an ascribed leadership position, which coexists with various prominent ‘big men’, who have achieved power through oratory, fighting and their network of credit and debt relationships.

Samberigi is populated by the Sau-speaking people. The villages are dominated by a men’s house, the members of which belong to different clans. Because co-resident clan brothers are few in numbers (generations of endemic feuding or disputing have fragmented whatever larger units may have come into being), several clans commonly organise themselves into a single community with a well-established sense of their geographical and political boundaries. Clans own a district with other accreted clans being immigrants. Whereas single immigrants will eventually accrete to the host group and shed their immigrant status, larger groups are likely to retain their original clan name and become an element in a pair or cluster. There is no word for such a cluster/confederacy but it may be referred to as large clan. The society has two polar concepts of ‘person and status’: the ‘big men’ (based on wealth and success) and the ‘little men’ (who are physically weak, socially reserved and ineffectual). The Sau/Kewa have no chiefs or hereditary status. Rather, influence is built around big men and the cycle of exchanges.

The social organisation of all the Kikori peoples, the Kerewo, Rumu, Kibiri and Kasere, is based on patrilineal descent with a settlement pattern of villages divided into numerous agnatic descent groups. Village leadership generally passes by primogeniture to the eldest descendant in the direct male line from the founder. Clan segments are frequently dispersed throughout the gulf but retain natal clan membership and identity through traditional naming practices.

15.5.2 Representative Community Organisations

One of the most significant impacts of the petroleum projects to date has been the facilitation of a multi-level series of representative community organisations. The three most significant representative bodies that exist are:

- **Incorporated land groups.** Legally registered corporations for the management of land resources. Registration is governed by the Minister of Lands and the Registrar of Titles. One of their functions under the Oil and Gas Act s. 169b is the identification of landowner beneficiaries. Section (3)f states that beneficiaries of project benefit trusts, unless otherwise agreed between the state and grantees of the benefit or prescribed by law, shall be incorporated land groups on behalf of the grantees.
- **Landowner companies.** Incorporated under the *Papua New Guinea Companies Act 1997* and provide for local businesses seeking access to resource project contracts for goods and services.
- **Landowner associations.** Incorporated under the *Associations Incorporation Act 1966* to collectively represent local landowners that may also have formed themselves into incorporated land groups or agencies¹ within a petroleum pipeline licence (PPL), a petroleum retention licence (PRL) or a petroleum development licence (PDL). Whereas incorporated land groups function to receive and distribute royalties and equity dividends, a landowner association is supposedly vested with authority to represent landowners in negotiations that may affect their social and economic welfare. Landowner associations are not formally recognised by, or alluded to in, the Oil and Gas Act, but they are often mandated by memorandums of agreement, development agreements and memorandums of understanding.

Village planning committees advise the petroleum producers of priorities for supported community projects and village liaison officers provide day-to-day contact.

These representative community organisations are important institutions that afford landowners the opportunity to represent and negotiate their interests both with other landowner groups, the government and developers. They further reflect the human rights circumstance of these indigenous constituencies to the extent that benefit quantum and distribution, labour conditions, security, health and safety are all facets of the agreements they strike with development stakeholders. In particular, the landowner companies process labour issues, including resourcing, recruitment, employment conditions, and access to free collective bargaining.

¹ Agencies are clan/sub-clan representatives, who receive benefits on behalf of, and subsequently distribute to, their constituencies. The agency system is currently used by Oil Search Limited in their gas operations at Hides.

15.5.3 Non-government Organisations

The Community Development Initiative has been established and supported by petroleum producers to address the social needs of rural communities, and has taken over many of the community functions previously undertaken by the companies themselves, including out-reach programs in health, education and livelihood development. The Community Development Initiative has offices in Port Moresby, Moro, Samberigi and Kikori, and acts as a service facilitator, rather than provider, acting jointly with government agencies that currently lack resources and training. It is funded mainly by the petroleum producers, with some funds for the health and education programs from outside agencies.

A variety of faith-based organisations are active in social development, health, education and agriculture.

The main active international non-governmental organisation is the World Wide Fund for Nature (WWF).

15.6 Health

15.6.1 Infrastructure and Service Delivery

The basic health service infrastructure in Papua New Guinea consists of 614 health facilities (19 provincial hospitals, 52 urban clinics, 201 health centres, and 342 sub-centres). The health system employs about 12,400 staff across the 614 health facilities. The church mission-managed components of the health system, which is largely financed and the operating costs largely funded by the government, accounted for 23% of all staff and 44% of facilities.

The SIA indicates that the existence of hospitals, health centres and aid posts across the project impact area did not necessarily mean a well-serviced community health system. Similarly, a functional and expenditure review into the PNG health system in 2001 (WHO, 2005a) described the health system in rural areas as being in a state of 'slow breakdown and collapse, currently being saved from complete collapse by donors'. The review stated, 'Where services remain, the breadth and quality of the services are diminishing.'

Key performance indicators of health such as maternal mortality ratio (MMR: the risk associated with each pregnancy, i.e., the obstetric risk number of deaths per 100,000 live births) have almost tripled between the 2000 census and the 2006 Demographic Health Survey. For comparison, the Australian MMR is over 200 times lower than the PNG level.

According to the SIA, despite significant revenue to provincial governments over the period 1995 to 1999 as a direct result of existing petroleum projects, there has been little improvement in the health sector in communities in the brownfields project areas. Noting the National Health Statistics for the three catchment areas, the SIA asserts that every significant indicator of population level health in the project impact area declined. Reasons for this include:

- An unclear allocation of responsibilities and inadequate implementation of key system functions.
- An inadequate oversight by the National Department of Health.

- A decline in the integrity of budget institutions and systems.
- A willingness to let multi-national and foreign aid efforts and financing try and fill the void.

Health outcomes are critically dependent on the size, composition, and deployment of health staff, which are not monitored systematically in Papua New Guinea. For example, nurses and community health workers constitute 75% of the health workforce. However, the SIA notes that as many as 1,000 nurses and up to 1,700 community health workers currently on the payroll cannot be accounted for by the national payroll system. As many as an additional 1,000 community health workers may remain on the provincial payroll system in an 'unclear' performance status. It is not uncommon to find many rural aid posts, health centers and hospitals abandoned.

Provinces have been responsible for managing primary health care services (with local-level government and communities responsible for maintaining health facilities), with a provincial health advisor reporting to the provincial administrator. The national government has remained responsible for policy oversight (albeit with very limited capacity to enforce), hospitals (which are managed by autonomous boards), and pharmaceutical purchases. Project area health functions are under the jurisdiction of the Health Division of the Gulf, Western, Central and Southern Highlands provincial administrations. At the provincial level, the Health Division is headed by the Principal Health Adviser, who reports to the Provincial Administrator.

15.6.2 Principal Health Challenges in the Upstream Project Impact Area

The main health issues in the upstream project impact area are:

- Lack of knowledge and awareness about health.
- High vacancies in health worker positions of up to 40%. (It is not uncommon to find many rural aid posts and health centres and hospitals abandoned.)
- Shortage of medical drugs and supplies at health facilities.
- High staff absentee rates.
- Inadequate transport facilities and very high ambulance fees.
- Lack of resources or the will to travel to villages on the part of government health workers.
- Village health centres, such as Pimaga, Tugiri, Inu, Baguale, Paua, Homa, Kaipu, Sisibia, Waro, Kantobo, Kaiam, Kikori, Mananda, Ayegeiba, Walagu and Yuni, that have radios, often have the solar panels that recharge their batteries stolen.
- Uneven quality in services. Resource-rich project areas, e.g., Moran, get preferential treatment from the provincial government in contributions to health infrastructure such as ambulances.
- People are shy of treatment for STDs (but education is overturning this reluctance).
- Inadequate cold chain (refrigeration) system and no money for maintenance. The Community Development Initiative has recently taken on the task of improving this system.
- Malaria is ubiquitous and normal. Patients do not seek treatment and already distributed mosquito nets are generally not used. (The petroleum producers spray their accommodation areas, and there has been a big reduction of malaria at Hides as a consequence.)

- High rates of tuberculosis.
- Reporting or monitoring of health data is absent.

Figure 15.3 illustrates the distribution of health facilities within the upstream project impact area.

15.6.3 Morbidity and Mortality Profiles in the Upstream Project Impact Area

The United Nations' PNG Millennium Development Goals report (UNDP, 2004) assessed Southern Highlands and Gulf provinces as amongst the four worst on their composite Millennium Development Goals index. Gulf scored particularly badly for mortality and Southern Highlands Province scored poorly for education, literacy, fertility and reproductive health generally.

The social and environmental impact statement prepared for the PNG Gas Project in 1998 (PDM, 1998), noted that 'the overall health status in Kutubu, Gobe and Kikori was poor, with high rates of malaria, respiratory infections, pneumonia and infant and maternal deaths'. The 2008 SIA concludes that little has changed since then, despite greater oil revenues flowing to the provincial governments.

Diarrhoea continues to be endemic, infectious diseases remain prevalent in both provinces, and reported AIDS/HIV cases have increased dramatically in the Kikori area. Pneumonia and diarrhoea, together with underlying malnutrition, are the main causes of post-neonatal death in young children.

Table 15.2 shows the main causes of mortality and morbidity in the upstream project impact area, with admissions and deaths for pneumonia and malaria across the catchment areas well above the national averages.

Table 15.2 Principal causes of morbidity and mortality in the project impact area

Disease	Cause of Out-patient Visits	Cause of In-patient Stays	Cause of Death
Malaria	Yes	Yes	Yes
Respiratory infections	Yes	Yes	Yes
Anaemia – Pimaga	Yes	Yes	Yes
Anaemia – Kikori	No	No	Yes
Diarrhoeas	Yes	Yes	No
Neonatal sepsis	No	Yes	Yes
Meningitis	No	No	Yes
Skin infections	Yes	No	No

Figure

15.3 Distribution of health facilities in the upstream project impact area

15.6.4 Disease Control Issues

15.6.4.1 Tuberculosis

Tuberculosis is a significant cause of morbidity and mortality among adults in Papua New Guinea. In addition, the rapid increase in HIV infections in the last 10 years means that deaths from tuberculosis are projected to become the most common co-infection. In Africa, tuberculosis is the leading opportunistic infectious cause of AIDS-related deaths.

Between 1996 and 2000, pulmonary tuberculosis cases rose by 21% (from 3,916 cases to 4,723), and mortality also increased. The WHO 2008 database (WHO, 2008) indicates that tuberculosis prevalence (number of existing cases per a population denominator) in Papua New Guinea for 2005 was 513 cases per 100,000 while the incidence rate (number of new cases in a defined time period) was 250 per 100,000 population per year. To place these numbers into context, the incidence and prevalence in Australia are both 4 per 100,000.

The causes of such high rates of tuberculosis include:

- Malnutrition and living in houses with inadequate ventilation.
- High treatment drop-out rate among infected cases.
- Limited laboratory and x-ray facilities result in tuberculosis diagnoses being made on clinical grounds.
- As few as one-third of new cases of sputum-positive pulmonary tuberculosis are detected and treated by the health system.
- There is no data on the cure rate.

The rate of multi-drug resistant tuberculosis is 3.6% and appears to be rising.

15.6.4.2 Malaria

Malaria is endemic and among the top five causes of morbidity and mortality in the region and the leading cause of hours lost by petroleum production workers. Malaria is also the most frequently recorded outpatient diagnosis (annual incidence of 300 or more per 1,000 people at risk) and the second leading cause of admissions (greater than 800 per 100,000 individuals) in health facilities in many endemic areas.

The Community Development Initiative has instituted a number of partnerships with malaria research agencies, e.g., the Institute of Medical Research, Goroka and the Swiss Institute of Tropical Medicine, University of Basel, Switzerland. The former screened 1,863 individuals in 11 villages between October and December 2003 and found malaria to be common at all altitudes with mosquito-net use declining and prevalence rising with altitude.

The health intervention program in Juha between 2006 and 2008 was conducted by Oil Search Limited health officers and Table 15.3 provides some raw data on what ailments were treated and seen in the outpatient clinics. Malaria and mild pneumonia cases predominate in Febi patients who presented.

Table 15.3 Outpatient ailments in Juha (PRL-2) area

	Simple Cough	Pneumonia	Other Respiratory	Diarrhoea	Malaria	Accidents and Injuries	Other Skin Diseases	Ear Infection	Eye Infection
Gesesu	1	0	0	0	1	1	4	0	0
Siabi	3	0	2	5	3	1	2	0	0
Tobi	0	0	0	0	0	1	5	0	0
Tinahai	1	0	3	0	1	4	7	0	0
Komogato	0	1	4	0	3	3	3	2	0
Suabi	54	1	0	0	12	1	1	2	1

15.6.4.3 Sexually Transmitted Diseases

Papua New Guinea's health sector faces the added burden of having to deal with one of the most serious HIV epidemics in the Asia-Pacific region, according to the SIA.

Papua New Guinea has the highest prevalence of gonorrhoea (12%) and genital chlamydia (27%), and the second highest prevalence of syphilis (3.7%) in the Asia-Pacific region, the fourth highest prevalence of HIV in Asia Pacific and the highest HIV prevalence of all Pacific island nations as cited in the SIA.

It is claimed (Nepel, 2005) that PNG is facing a major epidemic with annual increases of between 15 to 30%, and 10% of the population could be infected by 2010. Data are largely drawn from the National Aids Council Secretariat and Department of Health HIV/AIDS Quarterly Report December 2006 (NACS, 2007).

To the end of December 2006, a total of 18,484 cases had been detected distributed approximately equally between men and women. On the basis of the data available, there has been no exponential growth of HIV in the country. In 2005, there were 3,053 new cases, while in 2006 this figure had risen to 4,017. Again, there are some deficiencies in the data as, in Papua New Guinea, 'cases' are reported rather than actual incidence or prevalence rates and testing is done on an 'opt out' basis.

It is generally accepted, according to the SIA, that some 2% of the population may be infected at present, with 60% of HIV-positive persons living in rural communities.

According to the SIA, Oil Search Limited's health unit started voluntary counselling and testing in a few health centres in the project impact area during 2008. Oil Search Limited has reported thus far that they have detected HIV cases in most villages. The Department of Health has supplied Oil Search Limited with free anti-retroviral drugs. Oil Search Limited have an agreement with the Department of Health and the Asian Development Bank focusing on improving clinical services to better manage HIV.

Oil Search Limited supports and sustains the health services through training, infrastructure and systems management. Oil Search Limited programs in the upstream area are run by their health unit within Community Affairs.

Community Development Initiative has also undertaken health education and awareness programs on HIV, AIDS and the prevention of sexually transmitted diseases at various villages and schools within the project impact area. The SIA notes, however, that some local churches at some villages are advising communities against the use of condoms.

Community Development Initiative has had a considerable input into project impact area communities between Kutubu and Kikori, such that they were a major agency for health facilitation and provision, according to the SIA.

Community Development Initiative inputs to health have included, but were not limited to, the following:

- Undertaking out-reach clinics and immunisation programs in project impact area villages.
- Undertaking school health visits. In 2004, Community Development Initiative conducted 26 school health visits attended by 3,237 students of which 10% were female.
- Transporting medical supplies (drugs and vaccines) to aid posts and hospitals.
- Distributing health leaflets, pamphlets, and broadcast health programs on FM radio.
- Building capacity by providing additional training and experience to health workers by attaching visiting resident medical officers, medical students and other health interns to health facilities.

According to the SIA, since 2007 the health programs of Community Development Initiative have lost some of their institutional links, and been streamlined and aligned with those of Oil Search Limited health unit to focus on:

- Immunisation.
- Mother and babies programs.
- HIV program awareness.

Figure 15.4 shows the distribution of HIV/AIDS cases.

15.7 Education

The Education Branch of the respective provincial administrations is headed by the Principal Education Adviser, who reports to the Provincial Administrator. The Provincial Management of Education operates independently of the National Department of Education, except for matters related to national standards and curriculum. The Education Branch reports all matters of service delivery and policy development to the Provincial Education Board, which is nominally constituted by community representatives, including members from the local-level governments and churches.

Figure

15.4 Reported HIV and AIDS infection cases in Papua New Guinea

15.7.1 School System

The system depicted in Table 15.4 applied across the project impact area until the 1991 education reforms began to introduce the uniform feeder system illustrated in Figure 15.5. The school system in 2008 is a mixture of both systems. Each village is supposed to have a feeder elementary school. In reality, although many villages have registered their elementary schools, many are inoperative with nil enrolments to date. In effect, each locale's system is dependent on numbers of children willing to go to school, available staff, available supplies, and buildings.

Table 15.4 School systems before the 1991 education reform

Type	Grades	Age Group
Community	Grades 1 to 6	6 to 12 years old
High School	Grades 7 to 10	13 to 18 years old
Senior High School	Grades 11 to 12	
College of Distance Education (CODE)	Grade 6 completed	Can complete to Grade 10 by correspondence
Vocational School	Grade 8 completed	Post Grade 8 completion

15.7.2 Educational Level and Enrolment

The baseline data collected variously from 1997 to 2005² for the upstream project impact area indicate the following generalisations for the area between Juha and Goaribari:

- Of respondents over the age of 6 years, 45% have not attended school (Table 15.5).
- Only 43% of children between 6 and 14 years presently attend school.
- Only 17% of females over the age of 6 have completed grade 6, compared with the 2000 census national average of 62%.
- Some 60% of women are illiterate compared with 45% of men (see Table 15.5).
- Of those over the age of 20, 48% of males and 64% of females have had no formal schooling.

Table 15.5 Formal education and literacy levels

Upstream Project Impact Area Catchments	Over 6 Years Old: No Formal Education		Over 15 Years Old: Literate	
	Males (%)	Females (%)	Males (%)	Females (%)
Hides	37	50	54	36
Kutubu	35	45	67	48
Kikori	31	38	62	51
Gobe	36	52	67	44
Moran	63	72	30	18
South East Mananda	49	64	49	31
Total	40	50	55	40

² This data is supplied by Oil Search Limited in their March 2008 Summary Social and Economic Report and draws on the various SIA/SEIS household surveys conducted for them from 1997 to 2005.

Figure

15.5 PNG education system

The Kutubu-Gobe Petroleum Project Social Impact Analysis noted that 'gender inequity in school enrolments and continued further education has now emerged as a major problem in the PIA' (Goldman, 2002). The 1998 Gas Project Social and Economic Impact Study similarly commented on the need for educational planning to 'improve the access of girls to educational services and retain their enrolment' (PDM, 1998). The social roots of these entrenched patterns are complex, and no doubt reflect differential parental support patterns to children based on traditional expectations of gender roles. Females are thus expected to marry and, with high male absenteeism, care for gardens, pigs and children. In respect to tertiary education participation, Webster (as cited in the SIA) attributes the noted lack of female university students to the following social factors:

- Lack of female role models in the paid workforce. Too often females are perceived in male-dominated cultures as tickets to bride-wealth and child bearers. In this regard, women tend to leave school earlier to fulfil a culturally pre-determined destiny.
- University selection is based on Grade 12 exam results. However, by Grade 12 the drop-out rate for females is well established.
- Schools with low levels of resources, poor quality teachers, high teacher turnover and poorly managed education systems score poorly in exams. Students in provincial government areas where education is not well supported tend by comparison to do less well.
- Higher education qualifications are not common (Figure 15.6). Of the students who have completed Grade 10, only 0.3% of females and close to 1% of males aged over 20 complete tertiary qualifications.

Attainment of higher education qualifications in the project impact area is predictably low, with few people having alternative training qualifications.

Table 15.6 provides raw data from University of Papua New Guinea enrolments for 2006 and 2007. The table illustrates the relatively low participation rate of females from the Southern Highlands Province, despite the province having a fairly high percentage of the total student population.

Table 15.6 University of Papua New Guinea Waigani campus 2006/07 enrolment statistics

Province	Full-time		Part-time		% of Total Student Population
	Male	Female	Male	Female	
<i>Southern Highlands</i>					
2006	164	72	2	3	5.7
2007	180	86	2	3	7.6
<i>Western</i>					
2006	33	20	-	-	1.3
2007	33	23	-	-	1.7
<i>Gulf</i>					
2006	43	44	1	1	2.1
2007	52	48	1	1	2.8

The SIA notes that, on nearly all measurable parameters, males tend to have progressed further than females in the education system. Within the brownfield area, Gobe and Hides populations appear to have higher educational levels than Kutubu, Kikori and Moran catchments, particularly in the proportions that have attained Grade 12 education. Almost 19% of Gobe survey participants had completed Grade 12, compared to an average 5% across other catchments.

The overall profile of educational achievement as reflected in respondents' answers was poor with many not having completed any grade, and low levels of vocational and tertiary qualifications. The SIA notes that, since 1998, there appears to have been minimal improvement in educational achievement.

Figure 15.7 shows the main education infrastructure in the upstream project impact area.

Some teacher–student ratios indicate a slight improvement since 2004. Southern Highlands Province has gone from 1:34.5 to 1:32.3 in 2006; however, Gulf Province has shown a slight deterioration from 1:22.1 to 1:24.2. Gender participation levels among teachers and students are uneven.

Figure 15.8 provides findings from the 2005 to 2008 household surveys and shows the differences between the less advantaged region of Juha and the relatively advantaged areas of Gobe and Kikori. The Huli have higher rates of illiteracy than those in either the Gobe or Kikori region, while illiteracy is generally higher in females, who tend to drop out of school between Grades 6 and 10.

15.7.3 Education Sponsorship

Annually, Oil Search Limited provides K900,000 to support tertiary training within their project area. Preference is given to those people wishing to attend trade courses, or undertake training in health or education, so these skills can be transferred into the project impact area. Table 15.7 provides a summary of the sponsorship for 2007. A total of 489 education sponsorship applications were received for 2007 (20% from females), of which 123 were approved (19% female).

Table 15.7 Tertiary education sponsorship 2007

Project Impact Area	Ongoing Students		New Students		Total
	Male	Female	Male	Female	
Hides	15	3	10	0	28
Kutubu	5	0	9	3	17
South East Mananda	5	0	2	1	8
Gobe	10	1	6	7	24
Moran	9	4	20	1	34
Along the pipeline from Gobe to the Kumul Marine Terminal	3	0	6	3	12
Total	47	8	53	15	123

Figure

15.6 Project impact area higher education profiles

Figure

15.7 Distribution of educational institutions across the upstream project impact area

Figure

15.8 Illiteracy rates identified in the project impact area from 2005 to 2008

Figure 15.9 gives a short-term view of the sponsorship scheme, and shows that progress in achieving a better gender balance will be a slow, evolutionary process. A change is needed in cultural attitudes and expectations about female roles in the community before more women envisage their future in further education fields.

Through its support of the CDI-managed Certificate of Tertiary & Community Studies (CTCS), Oil Search Limited provides Grade 10 school leavers with the capacity to gain a university entrance level qualification. In 2007, there were 35 students in Semester 1, and 44 students in Semester 2 of their CTCS studies.

15.8 Agriculture, Fishing and Hunting

15.8.1 Agriculture

For much of the last century, agriculture has been the backbone of Papua New Guinea's economy. In the Southern Highlands Province, swidden horticulture, using a bush fallow technique, predominates. Highlands populations maintain gardens in fertile volcanic soils, with the main staple crop being sweet potato, supplemented by other crops, such as bananas, yams, taro, and sugar cane.

Much of the project impact area is, however, characterised by a difficult terrain that contains sink holes, steep ridges and limestone outcrops. Moreover, areas around Lake Kutubu and throughout the Kikori River delta are regularly inundated by water, restricting the proportion of land suitable for agriculture. As such, the Kikori River catchment remains heavily forested and sparsely populated. In this region, horticulture contributes less to subsistence production than does sago, fishing, hunting and gathering.

The tropical forest and waterways of the gulf abound in diverse species that provide sources of regularly consumed fish protein.

The three distinct forms of subsistence land use in the upstream project impact area are:

- **Sago-palm cultivation.** Yields of between 100 and 150 kg per palm means that a single palm is usually sufficient for a family for a month. Palm by-products are used for roofing and building. Palm stands have group ownership, but exploitation is usually in the hands of individual families or people. Both males and females inherit rights to trees. Land ownership can be altered immutably through purchase, and usufruct rights can be granted for limited periods. In effect, individuals hold rights to tracts inherited through kinship and/or descent in communal clan lands.
- **Hunting, gathering and fishing.** Prey differs according to habitat. Ground level prey includes pigs, cassowaries, wallabies, bandicoots, hens, megapodes, rats and frogs. The lower canopy provides phalangers and snakes, and the high canopy flying foxes, birds and hornbills. The stream banks provide rats, crocodiles and lizards, and the rivers provide turtles, fish and crustacea, while fish (various species), prawns and mud crabs are caught in the lower Kikori-Omati delta. Plate 15.3 shows mud crabs being collected at Goaribari Island.

Figure

15.9 Comparison 2005 and 2007 tertiary sponsorship by gender

- **Swidden gardening.** The nuclear family tends to own specific gardens and provide labour. The gardens grow a wide variety of crops: sweet potato, taro, yams, banana, sugar cane, pandanus, breadfruit, okari, Malay apple and various leaf greens. Non-subsistence plants are also cultivated, e.g., *Derris* sp for fish poison, *Yaemi* for canoe logs, *Broussonetia papyrifera* for plaited carrying bags, *Nicotiana* for smoking and *Bambussa* spp. for cooking and water storage vessels.

15.8.2 Fishing

Fish are the main source of protein for the people living around Lake Kutubu. The lake contains at least 14 fish species and is regarded as having high research and conservation value as most species are endemic to the lake. As much as 70 t of fish with an estimated value of K400,000 are removed from Lake Kutubu annually. However, reports indicate that the fish catch is in decline, due to increases in human population and fish catch efficiency (use of gill nets). The National Fisheries Authority and Department of Fisheries are responsible for research, administration and local fisheries management plans.

The saline and brackish swamps in the Kikori River delta are among the largest in the South Pacific. Fish, turtles, crabs and shellfish have traditionally been an important source of food for villagers in the Kikori River delta, and provide an important source of cash income. More than 60% of the households surveyed in the Kikori area from 1998 to 2005, compared with a mean average of 13% for Kutubu, reported cash income from fish during the past year.

15.8.3 Forestry

The SIA cites many certified logging areas across the project area and landowners often receive royalties and premiums from these activities. The only active forestry concessions are in Gulf Province as forest management areas in the Southern Highlands Province are still at the proposal stage or are in dispute. Apart from Kikori, other areas have experienced very little logging, other than that associated with walk-about sawmills (see also Section 18.7, Biodiversity).

15.8.4 Commercial Activities

Many areas of PNG have entered the cash economy through the development of cash crops, for example coffee, chilli, mandarins, rice and vanilla. In the project area, however, there have been a number of trials since 1914 – copra, cocoa, rubber, rice, crocodiles, butterflies, etc – but all with variable and little sustainable result³. Smallholders have focussed their agricultural efforts principally on subsistence production, and so for many people in the project impact area, regular participation in the cash economy started as late as 1990, and was a result of monetary benefits from, and employment in, the oil industry.

Levels of participation in the cash economy are uneven across the project impact area and generally remain low across the brownfield catchments. This variation is most marked between the more urban villages of Kopi/Kikori and Moro, and the wholly rural catchments of Hides, Juha, Komo and Moran. However, none have yet taken off in a manner likely to have a material impact on local cash economies in the project impact area.

³ A history of these ventures is given in the 1998 PNG Gas Project SEIS (PDM, 1998).

The tropical forest and waterways of the Gulf Province are abound in diverse species (37 ethnobiological species are recognised) which provide a primary reservoir of regularly consumed protein. The main limitations are not availability but access constraints (imposed by flooding). Rivers provide at least 22 edible species of fresh and saltwater fish, eels, turtles, crayfish and prawns.

Various attempts to commercialise agriculture have failed and smallholders have remained focused on subsistence production, with a gradual increase in livestock (Table 15.8). Agricultural and livestock opportunities remain largely undeveloped due, in part, to lack of communications and transport infrastructure.

Table 15.8 Average livestock per household

Livestock Per Household	1998 SIA		2001 SIA			2005 SIA			2008
	Kutubu	Kikori	Kutubu	Kikori	Gobe	Kutubu	Kikori	Gobe	Juha
Pigs	2.7	0.7	3.9	1.9	4.3	3.6	1.8	4.5	4.6
Chicken	4.5	3.5	3.4	2.3	5.2	12.3	5.3	11.6	4.4
Cattle	-	-	0	1.2	4.3	0	1.8	9	0

Across the PIA, there is a general perception within the populace that local species are dying out, are not as abundant, or are moving further away. The same responses were given in focussed interviews in Kutubu about the developing scarcity of fish. Figure 15.10 illustrates this point by showing the percentage of responses for the category of the SIA household survey questions J1-3 and J18 concerning declining species number. Even in the remote area of Juha, this perception is equally marked.

15.8.5 Markets

Most communities in the upstream project impact area have average-to-good public markets, particularly at Pimaga, Kikori and Moro. These contain a range of food and non-food items, including banana, marita, monkey nuts, pig meat, corn, rice, stock cubes, soap, cooking oil, rice and small items like cigarettes and tobacco. Games, in which money can be won, such as darts and cards, are also played. The main buyers at the urban hubs are government employees and landowners, who receive money from oil benefits. Rural markets are limited, but what little cash they yield is principally earned by women.

Small trade-stores can be found in most areas except Juha. They tend to be transient, because restocking of goods is expensive and logistically difficult and profits tend to go into personal credit and loan networks. Barter and deferred payments are common for close relatives or friends and new stores are often motivated by the status of having a business, rather than a commitment to making the business survive. Customers are often 'clan aligned', so people only patronise trade stores operated by kinsmen.

Figure

15.10 PIA perceptions of decline in hunted species

15.8.6 Resettlement

The SIA household survey noted that, for the brownfield project impact area, the main reasons for migration are family/kinship, tribal and land disputes, better services and employment. While there is generally no single reason for moving, the high level of tribal fighting rationales is consistent with fieldwork observations in highlands catchments, such as Huli and Gobe. In the greenfield Komo catchment, tribal fighting (78%) was more frequently cited as a migration reason than employment (17%) or family/kinship (5%) reasons. For Huli, this is an important insight. It explains that having multiple affiliations to various communities on the basis of kinship/descent and/or affinity provided opportunities to escape conflict situations. It is therefore a partial insight into why Huli have gardens in various localities. This is not just to rotate fallow gardens, or escape environmental conditions (flood, drought or fire) in specific places, but allows them to react to dispute by withdrawal.

15.9 Transportation and Communication

15.9.1 Roads

Before the Kutubu Petroleum Development Project, access to the upstream project impact area was by foot, ship to Kikori, plane to Pimaga or Kutubu, or small aircraft to one of the grass airstrips serving various mission stations. The only roads were around the Kikori, Tari and Pimaga government stations, with no links to the outside world. More than 800 km of roads have since been constructed and have increased the mobility of the population and their access to development and services. Figure 5.5 depicts the existing and planned road infrastructure status in 2008.

The existing petroleum producers contract local landowner companies to maintain the roads that they need. Motor vehicle ownership of 4% is very low and often reflects a share of a vehicle, rather than sole ownership.

Travel patterns have been surveyed through the years 2005 to 2008 and the results are presented in Figure 15.11.

The figure shows the travel destinations of people from a given catchment. In effect, the levels of reported travel have remained fairly constant in the last four years for the Gobe-Kikori-Kutubu catchments. As might be expected, females report travelling a lot less than their male counterparts, mostly because of domestic duties, responsibilities and lack of money. There is clear evidence that women do not get equitable access to ILG benefits and thus have less disposable income. A surprising proportion of Portion 152 males (64.1%) reported they had been to Tari in the Southern Highlands Province, and an equally surprising number responded they had travelled overseas (15%: and 10% for males: females respectively).

Figure

15.11 Travel profiles 2005 to 2008

15.9.2 Air Services

The Kutubu and Gobe petroleum development projects built airstrips at Moro (1991) and Gobe (1997) and commercial and charter flights now run from these destinations on a regular schedule. An airstrip was also built at Kantobo under an agreement with the landowners. Gulf and Southern Highlands provincial governments plan to upgrade the airstrips at Kikori and Tari respectively. The airstrip at Komo has been re-fenced but has not been used for at least a decade.

15.9.3 Communications

The petroleum producers have installed satellite communications at all their camps in Hides, Moro, Gobe and Kopi, and these have been available to landowner companies and other organisations.

High frequency (HF) radios have been installed in health centres in most of the villages (e.g., Baguale, Inu, Tugiri and Mano) and are available to residents in emergencies.

The Kutubu Rural Local Level Government Special Projects Authority in 2005 installed VSAT (very small aperture terminal) rural communications systems at Pimaga station, Waro, Moro, Aa'io and Inu. The system works with telecards available from trade stores.

In 2007 and 2008, Memorandum of Agreement (MOA) and other funds administered by the Department of National Planning and Monitoring, under arrangements associated with the development of the South East Mananda oilfield, were released to the Mananda Umbrella Joint Venture landowner company (MUJV). Some of the funds released were used to install VSAT rural telephone systems at Muluma/Bona, Walagu, Ajakaiba and Kukubalu villages as well as at the Catholic mission in Komo.

At present international roaming cell phones can operate from Port Moresby, Tari and Kutubu.

Communications are thus highly localised, but they are a substantial improvement over the VHF radios at government stations that was available prior to 1990.

15.10 Upstream Project Impact Area Economic Activity

15.10.1 Local Businesses

Local business opportunities in the upstream project impact area involve landowner companies fulfilling contracts with the existing petroleum producers. The gross contract value of work awarded directly to landowner companies and joint ventures involving landowner companies totals more than K866 million since the start of the Kutubu and Hides projects to the end of 2007.

Landowner companies receive further income from oilfield service companies in particular drilling companies. This often involves inter-ethnic consortia of different landowner companies.

The landowner companies themselves provide employment, distribute dividends to shareholders, engage local services and buy or hire local goods, such as timber, plant and light vehicles. They subcontract smaller clan groups, and most of the larger umbrella landowner companies support and make donations in cash or kind to local churches and community organisations.

Other small-scale business ventures in the upstream project impact area include logging and saw-milling, small-scale cash cropping of chillies, coffee, vanilla, and poultry and pig husbandry.

Business development is constrained by poor roads and no cultural enthusiasm for maintaining equipment: goods that fail are replaced, not repaired. In broad terms, companies in the project area depend on the petroleum industry for business.

Petroleum Resources Kutubu has recently constructed a building at Moro that is now leased to the Bank of South Pacific. This has been a major development in the area, as all previous bank facilities have proved unsustainable due to criminal activity. It is hoped that, if this bank proves successful, other branches will open in key rural and urban hubs such as Tari, Hides, Gobe and Kikori.

15.10.2 Personal Income

Data over time indicate that bride-price (42.32%), fishing and cash cropping, and exchange (*wantok* gifts, 49.32%) continue to dominate the cash component of the upstream project impact area economy. Most respondents reported some form of income⁴ at the same levels, and from the same customary sources, as previously recorded in the 2005 PNG Gas SIA (Enesar, 2005) (Table 15.9).

Table 15.9 Proportion (%) of households surveyed reporting specific income sources

Source	1998 SIA - % Households Surveyed		2001 SIA - % Households Surveyed			2005 SIA - % Households Surveyed			2007 to 2008 SIA - % Households Surveyed	
	Kutubu	Kikori	Kutubu	Kikori	Gobe	Kutubu	Kikori	Gobe	Juha	Komo
Employment	14.5	25.5	8.9	18.9	24.5	13.4	10.1	16.4	15.8	23.4
Royalties	83.1	37.3	55.8	43.3	0	26.2	40.4	58.8	13.7	3.4
Business	20.5	19.3	15.4	14.7	7.3	5.6	11.6	2.9	0	22.8
Cash crops	22.9	43.5	16.3	30.9	20.0	17.3	33.3	22.9	2.6	6.7
Livestock	19.3	15.5	9.3	16.1	16.4	8.9	6.0	2.3	5.2	9.2
Fishing	14.5	61.5	11.4	67.7	0.9	18.5	61.1	0.0	2.63	49.3
	1998 total		2001 total			2005 total				
Bride-price	61.5		50.0			42.3			44.8	32.4
<i>Wantok</i> gifts	66.8		62.8			49.3			15.8	47.2
Savings	32.4		16.0			8.3			0	10.4

Significantly the low 8.3% for 'savings' in the 2005 survey reflects low investment regimes within the project impact area. These survey findings for income endorse previous SIA comments that traditional forms of income and expenditure have proven largely resistant in the short to medium-term to change or eradication. Any new and cumulative income from an LNG project will be expended in ways that are evidenced in patterns for expenditure in the environs.

⁴ The SIA explains in detail why attempts to gauge monetary value of incomes and expenditures will prove inaccurate in household surveys in this region.

The patterns of expenditure recorded in respondent answers to SIA household survey questions Q:E 1A-H similarly point to the continuity of traditional patterns of social exchange through bride-price, *wantok* gifts, funeral donations and compensation associated with disputes. Figure 15.12 shows relatively similar respondent accounts in regard to expenditure behaviour from 1998 to 2005. Note that these figures are calculated as raw totals irrespective of catchment differences in the three SIA household surveys.

Of the new greenfield catchments of Juha and Komo (Figure 15.13), Komo results match the norm for Huli areas.

School fees, household consumption and church donations are reported most commonly as avenues of household expenditure by those respondents in receipt of petroleum project money (average 70%).

Of the goods purchased at trade stores, rice, canned drinks, and soap were the most common items reported across the brownfield area, whilst for market purchases, vegetables, buai and fruit appeared most commonly. Figure 15.14 gives a comparison of trade store purchases across the 2001 and 2005 SIA household survey. The results for 2005 are marginally different from 2001 and explained in part by changes in the sample area and by the lower incidence of trade stores in the Hides-to-Moran area.

15.11 Government

15.11.1 National Government

Papua New Guinea is a constitutional monarchy with a parliamentary democracy. The head of state is Her Majesty Queen Elizabeth II, represented in Papua New Guinea by the Governor-General, who is appointed by the National Executive Council (cabinet).

The head of the government is the Prime Minister, who is appointed and dismissed by the Governor-General on the proposal of Parliament. The Prime Minister is usually the leader of the majority party (or majority coalition) in Parliament. The National Executive Council is appointed by the Governor-General on the recommendation of the Prime Minister.

The nation is divided into 20 administrative units (19 provinces and the National Capital District of Port Moresby). Each province is subdivided into various districts, which have a number of local-level governments, with councils having elected ward representatives.

The legislative branch is the unicameral National Parliament, which has 109 seats, 89 elected from open electorates (that is, within a specific geographic area) and 20 elected from 'provincial' electorates (that is, from each administrative unit as a whole). Members are elected by popular vote to serve five-year terms. The legal system is based on English common law.

The judicial branch is headed by the Supreme Court. The Chief Justice is appointed by the Governor-General on the recommendation of the National Executive Council after consultation with the minister responsible for justice. Other judges in the National Court and local or village courts are appointed by the Judicial and Legal Services Commission.

Figure

15.12 Expenditure patterns SIA 1998, 2001 and 2005

Figure

15.13 Expenditure patterns: greenfield and brownfield comparisons

Figure

15.14 Comparative trade store purchases SIA 2001 and 2005

15.11.2 Provincial Government

The Department of Provincial and Local Government Affairs administers the Organic Law on Provincial and Local-level Governments, which establishes the political, planning and financial management relationships between the national government and the provinces.

The administrative, executive and political structures provided for in the Organic Law and their relationships to national institutions are set out in Figure 15.15.

The Provincial Assembly is composed of members of the National Parliament (MPs), heads of local-level governments, and a limited number of appointed members representing women and other groups.

Each Provincial Assembly is chaired by a Provincial Governor, who is the member of the National Parliament and represents the provincial seat. Provincial governors can be removed by a two-thirds majority vote of the Provincial Assembly.

The Provincial Executive Council is the executive arm of the provincial government and is composed of the Provincial Governor, the Deputy Governor and the chairmen of the Provincial Executive Council's permanent committees. While the Deputy Governor is elected by the local-government members of the Provincial Assembly, the heads of the permanent committees are chosen by the Governor.

Each Provincial Executive Council is required to establish a Joint Provincial Planning and Budget Priorities Committee.

15.11.3 Local-level Governments

Under the Organic Law, local-level governments hold a constitutional mandate, a long list of legislative powers and, in principle, guaranteed funding. Their role in dictating the budget priorities for their area is intended to be reflected in the activities of the Joint Provincial Planning and Budget Priorities Committee, which should incorporate local government plans and budgets into its larger district plan. While local-level governments have capacity to collect revenue, in practice few do so and most are dependent on national government operation and development grants.

The Organic Law on Provincial Government was first introduced in 1977, in order to decentralise finance and decision making to rural level bodies, which were to provide social services and development. For many reasons, these reforms did not achieve results and in 1997 a new Organic Law on Provincial and Local Level Government was introduced.

Provincial and local-level governments are financed by grants from the national government and by 'internal' revenue, which is made up mainly of transfers of national taxation funds and a small amount of revenue that is generated by investments or under their own tax laws.

For provinces having mining and petroleum resources, the national government revenue transfers include royalty payments and development levies. In Southern Highlands Province, oil-related revenues have amounted to about 40% of the province's annual budget.

Figure

15.15 Provincial and local-level government structure

Provincial governments make nominal budgetary provision for local-level government administration costs but little happens in practice and the local-level government program is largely moribund (Table 15.10).

Table 15.10 Local-level government status in Southern Highlands and Gulf province project areas

Local-level Government	Functional Status	Current Development Plan
Southern Highlands		
Kutubu	Semi-functional	Yes
Hulia	Not functional	No
Haeapugua	Not functional	No
South Koroba	Not functional	No
Komo	Not functional	No
Erave	Not functional	No
Gulf		
East Kikori	Functioning	Yes
West Kikori	Functioning	Yes

15.12 Oil and Gas Governance

Table 15.11 illustrates the benefit streams that have flowed to stakeholder recipients from existing oil production operations in the period 1991 to 2007.

Table 15.11 Beneficiaries and benefit stream flows

Recipient	Benefit Streams	Total K (Million)
National Government	Taxes and equity	6,825
Landowner Cash Benefits	Royalties, equity, land compensation, land rentals	311
Landowner Non-cash Benefits	Business development benefits, memorandum of agreement grants, trust funds	1,560
Provincial Government/Local-level Government Benefits	Special support grant, royalties, equity, memorandum of agreement grants, development levies	610
Total		9,306

In all, petroleum development has generated K9.3 billion in benefit streams for the PNG Government, impacted landowners and the upstream project impact area provinces and local-level governments between 1991 and 2007.

The PNG Government institutions involved in the governance of oil and LNG revenues are listed below:

- The Department of Petroleum and Energy, which administers the *Oil & Gas Act 1998* and distributes royalty and development levy entitlements.
- The Department of National Planning and Monitoring, which administers the Medium Term Development Strategy, the Public Investment Program, the Tax Credit Scheme and the Special Support Grant, and the Expenditure Implementation Committee (established under the *Oil & Gas Act 1998*).
- The Mineral Resource Development Company (MRDC), which administers and distributes landowner and provincial government equity dividends and royalties.
- The Department of Finance, which supervises the compliance of government agencies and authorities with the *Public Finance Management Act 1995*.
- The National Economic Fiscal Commission, which is responsible for overseeing intergovernmental financial arrangements, making recommendations on the allocation of grants to provincial governments and assessing the impact of natural resource projects on national development.
- The Independent Public Business Corporation, which will hold 16.39% of the project through wholly owned subsidiary (see Section 1.3, PNG LNG Project Co-venturers).
- The Department of Provincial and Local-level Government, which administers the Organic Law and supervises the performance of provincial governments and any associated special purpose authorities.

The main governmental institution likely to have responsibility for the distribution of projected PNG LNG Project funds is the Expenditure Implementation Committee. The process will be the Benefits Sharing Agreement.

15.12.1 Expenditure Implementation Committee

This committee was legislated by the Oil and Gas Act and gazetted and established in March 2001. It held its inaugural meeting in May 2004.

The rationale for the committee was, in part, the realisation that provincial governments could not account for the expenditure of royalty, equity dividends, special support grants, memorandum of agreement and development levy funds. The Expenditure Implementation Committee is mandated to manage the expenditure of provincial and local-level government income, including disbursement of special support and memorandum of agreement grants. In future, the Expenditure Implementation Committee will have the responsibility to administer tax credit expenditure and the disbursement of development levies, but this committee has yet to function effectively on existing petroleum production projects.

15.12.2 Benefits Sharing Agreement

Section 50A of the Oil and Gas Act requires the government to negotiate, agree and execute a benefits sharing agreement between the state (Minister for, and Department of, Petroleum and Energy, and possibly other relevant government departments), project area landowners, affected local-level governments and affected provincial governments by PNG LNG Project operations.

This agreement will set out the basis for these parties to share royalties, development levies and other PNG LNG Project benefits. The negotiation process is in the early phase.

Section 174 of the Oil and Gas Act states that the total benefits received by recognised project area landowners, affected local-level governments, affected provincial governments and any other entities recognised by law plus the state's costs must not exceed 20% of the total net benefit to the state as determined by a cost-benefit analysis conducted by the National Economic Fiscal Commission under Section 16 of the Organic Law on Provincial Governments and Local-level Governments. In practice, this cap has been exceeded.

15.13 Gender and Women's Issues

The issue of the place of women both generally in PNG cultures and specifically within the politico-legal domain is a staple of anthropological writing on Melanesia. It has become almost *de rigeur* in social impact assessments to indicate gender inequity across a range of social situations.

From one perspective, this could be seen as a discriminatory form of community organisation that results in inequitable distribution of project benefits between local stakeholders. In pre-contact times, there was no ideological challenge by women to such a social order except in the frequent domestic arguments between family members. However, there has been a major change in women's attitudes, with many finding unacceptable the regime of male financial control.

With the lack of local-level government (LLG) implementation, women continue to be disempowered in terms of having a voice in local community decision-making. This situation will not change in the short term and will require concerted efforts on the part of all parties to monitor progress and effectively institute proactive gender policies. It is encouraging that there are now a number of elected women in the Koroba Town Council, and local landowner companies are beginning to understand the importance of having women directors. Changes to the distribution regimes for royalty and equity in both petroleum and gas projects should hopefully see women receive their benefits directly rather than through handouts from household males.

This SIA notes that women are conspicuously absent as signatories to MOA/MOU/development agreements.

Across the project impact area, there is close integration between women's activities and various church institutions. Women are by far the more active gender in regard to church attendance. In Hides, a female employee of Oil Search Limited Community Affairs office is in the Women in Development agency, which has built a partnership with the Church of Nazarene and their community-based health care programs. These activities were linked formerly to the Tari-based Nutritional Garden and Household Improvement Program scattered over the Tari basin. Women in Development is managing Community Action and Participation training in Maria, Magara and Hides areas at present. Such training includes gender attitudes and behaviour as linked to health, education, agriculture, religion, and economics.

Whilst no-one pretends these contributions produce a quantum shift in attitudes and cultural practices, over the long term they help disseminate the need for adaptation to changing social conditions. Equally, they stand as a countervailing testament to the general marginalisation of 'women's issues' in development-oriented social action programs.

Table 15.12 provides an overview of some Huli women's associations. There is no lack of interest by women in developing such associations throughout the brownfield area, and all that is missing is the financial assistance needed to provide proper meeting places, resources for training, and skilled community affairs personnel. By comparison with the coastal areas, the brownfield women's groups are functioning mostly in name only.

Table 15.12 Huli women's associations

Name	Area Covered	Remarks
Tari Women's Association	Covers three electorates	Umbrella association
Tari District Women's Association	Hayapuga LLG Tebi LLG Hulia LLG (Komo-Margarima electorate)	This group has other smaller associations
Koroba District Women's Association	Awi Lagayu LLG South Koroba LLG North Koroba LLG Kopiago LLG	Strong group
Komo District Women's Association	Hides 4, Komo, Kulu Pupa, Yuni Nogoli, Mbeloba	Vocal association leader
South East Mananda Women's Association		Newly registered association

Recommendations on how an equitable participation might be achieved are discussed in the SIA (Appendix 26, Social Impact Assessment).

Environmental Impact Statement
PNG LNG Project