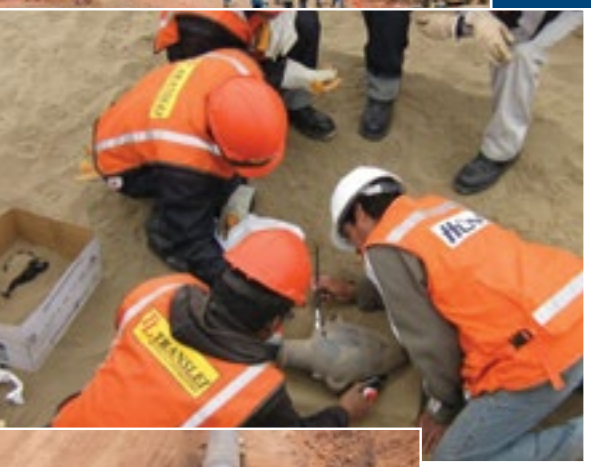

LESSONS OF EXPERIENCE

PERU LNG: A Focus on Continuous Improvement

No. 3, March 2013

IFC International Finance Corporation
World Bank Group

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Acronyms

BAC	Blood Alcohol Concentration
BMAP	Biodiversity, Monitoring and Assessment Program
BTC	Baku-Tbilisi-Ceyhan
DIR	Driver Incident Rate
E&S	Environmental and Social
EFS	Ecological Field Survey
ELUs	Ecological Landscape Units
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GPS	Global Positioning Service
H&S	Health and Safety
IFC	International Finance Corporation
Km	Kilometer
PLNG	PERU Liquefied Natural Gas
PMSAP	Programa de Monitoreo Socioambiental Participativo
RoW	Right of Way
TGP	Transportadora de Gas del Perú

I. Introduction

Extractive industry companies, particularly those operating in areas of high biodiversity value, on indigenous lands, or in close proximity to communities, face operational and reputational risks related to their environmental and social performance, and can be subject to intense scrutiny from stakeholders. Lenders, civil society, and the public at large demand that companies develop transparent and robust frameworks for assessing and mitigating potentially adverse environmental and social impacts while providing sustainable benefits to local communities. A robust management system is essential to achieve good environmental, social and health and safety performance and thereby build trust among stakeholders.

PERU Liquefied Natural Gas (PLNG), the first liquefied natural gas plant in South America, is an example of a high-profile project facing multiple environmental and social risks. Launched in 2007, the $3.8 billion project is one of the largest industrial projects in Peru. PLNG is considered one of Peru's key resources, and it is a core component of the Peruvian government's energy strategy. Over the course of six years, PLNG has shown a strong commitment to managing environmental and social risks throughout all the phases of the project. The project is currently in the operations and maintenance phase, having completed construction in 2010. The company has met its commitments with regard to the International Finance Corporation's (IFC) Performance Standards, demonstrating that projects with significant environmental and social challenges, operating in complex environments, can benefit from an outcomes-based approach and a management system relying on continuous improvement and adaptation.

Throughout its partnership with PLNG, IFC, the private sector arm of the World Bank Group,[1] has worked with the company to apply the Performance Standards on Environmental and Social Sustainability (Box 1) to assess and manage environmental and social risks and impacts. The 2006 IFC Performance Standards were applied to the PLNG project.[2]

Box 1: IFC 2006 Performance Standards on Social and Environmental Sustainability (Effective April 30, 2006 to December 31, 2011)

- Performance Standard 1: Social and Environmental Assessment and Management System
- Performance Standard 2: Labor and Working Conditions
- Performance Standard 3: Pollution Prevention and Abatement
- Performance Standard 4: Community Health, Safety and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management
- Performance Standard 7: Indigenous Peoples
- Performance Standard 8: Cultural Heritage

IFC's Performance Standards were updated and the revised version became effective on January 1, 2012. To access the 2006 and 2012 versions of the Performance Standards, see www.ifc.org/ sustainabilityframework.

[1] IFC offers development-impact solutions through firm-level interventions (Investment Services, Advisory Services, and the IFC Asset Management Company); by promoting global collective action; by strengthening governance and standard-setting; and through business-enabling-environment work.

[2] The 2006 edition of IFC's Sustainability Framework applies to investments that went through IFC's initial credit review process from April 30, 2006 to December 31, 2011.

About PLNG

- The PLNG project includes the liquefied natural gas plant, a quarry, a marine terminal and a 408 kilometer (km) pipeline. The pipeline is considered the highest gas pipeline in the world because it transports gas at altitudes of up to 4,900 meters.
- IFC, the Inter American Development Bank (IDB), and other international lending agencies provided a total of $2.05 billion in loans to the project, with IFC's contribution being $300 million. IFC Advisory Services helped PLNG implement participatory monitoring and social investment programs.
- The natural gas is sourced from natural gas fields in the Cusco region and transported to a natural gas liquefaction plant (see Figure 1).
- The plant is located at Melchorita, 169 kms south of Lima, and has capacity of 4.4 million metric tons per annum. From Melchorita, the liquefied natural gas is exported to world markets.
- The pipeline crosses 22 districts and 35 communities, including rural Andean communities and a range of habitats and topographies, presenting multiple environmental and social challenges and risks.

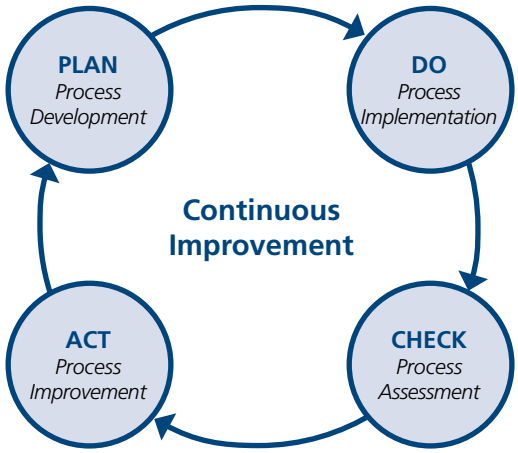
FIGURE 1: PLNG PIPELINE ROUTE

Adaptable Environmental and Social Management Systems

IFC's Performance Standard 1: Social and Environmental Assessment and Management Systems is the foundation of all other Performance Standards and establishes the importance of (i) an integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project.[3]

A key component of developing a flexible and robust Environmental and Social Management System (ESMS) is the concept of continuous improvement. Using this methodology, an organization creates a dynamic ESMS that can be modified over time based on feedback received during the Environment and Social (E&S) risk management process and the overall E&S project performance, including through engagement with stakeholders on how E&S risks can be managed.

FIGURE 2. THE CONTINUOUS IMPROVEMENT CYCLE



The continuous improvement methodology is based on four steps:[4] planning, doing, checking, and acting (see Figure 2). By undertaking this methodology, PLNG implemented an environmental and social risk management system that was "appropriate to the nature and scale of the project and commensurate with the level of social and environmental risks and impacts" in relation to Performance Standard 1.[5] PLNG also developed a continuous improvement management system aligned with other international standards such as ISO14001 and OHSAS18001[6] that was adaptive, robust and flexible enough to respond to environmental, social and occupational health and safety risks relevant to them.

Liquefied natural gas pipeline projects are often associated with a number of environmental and social risks that must be addressed by a comprehensive risk management system. Some of the issues faced by the PLNG project included: (i) several communities and other stakeholders living in or using the project footprint; (ii) health and safety risks due to hiring large numbers of new workers; (iii) potential for safety incidents and accidents from vehicle use; (iv) the presence of ecologically sensitive areas, particularly the Andean wetlands; and (v) the presence of 35 rural Andean communities along the pipeline.

This *Lessons of Experience* publication documents experience and lessons learned throughout the lifecycle of the project that are transferable to other projects. The lessons that follow illustrate how PLNG adapted its environmental and social risk management system, by learning from emerging risks and challenges in health and safety, labor, biodiversity conservation, and participatory monitoring.

[3] See Introduction to Performance Standards (2006), Paragraph 2.
[4] See Performance Standard 1 (2006), Paragraph 1.
[5] See Performance Standard 1 (2006), Paragraph 3.
[6] ISO 14001 maps out a framework that a company or organization can follow to set up an effective environmental management system. See http://www.iso.org/iso/iso14000 for more information. OHSAS 18000 is an international occupational health and safety management system specification. It comprises two parts, 18001 and 18002. For more information, see http://www.ohsas-18001-occupational-health-and-safety.com/

II. Health and Safety: Lessons Learned to Improve Driver Safety

The construction of a liquefied natural gas pipeline often involves transportation of heavy machinery and materials through populated areas. Performance Standard 4: Community Health, Safety and Security recognizes that projects can increase the potential for community exposure to risks and impacts arising from equipment accidents. This Standard "addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project activities."[7] It also provides that "for projects that operate moving equipment on public roads and other forms of infrastructure, the client will seek to prevent the occurrence of incidents and accidents associated with the operation of such equipment." The following lesson details some innovative ways in which PLNG achieved the safety requirements of Performance Standard 4.

THE CHALLENGE: Peru has a history of road casualties, with the third highest traffic accident mortality rate in the world—21.5 casualties per 1,000 inhabitants—according to the World Health Organization.[8] During the construction phase of the pipeline project (2008–2010), PLNG recorded a Driver Incident Rate (DIR)[9] of 2.82. While this was already well below the official internal target of 7.53, the company's ultimate goal was to reduce the rate to zero. This would be no small feat, given that PLNG drivers were to traverse 69 million kms during the construction period, often navigating unpaved, steep and narrow roads, from areas at sea level and temperatures above 25 degrees Celsius (77 degrees Fahrenheit), to high altitude roads affected by heavy rain or snow and temperatures below freezing.

THE APPROACH: To reduce the DIR, PLNG investigated driving incidents and developed a new culture of safety based on the results of these investigations. As part of their effort, the company studied two separate accidents that occurred in September 2008 along the main access road for the pipeline, the Via de los Libertadores Highway.[10] In both instances, drivers sustained minor injuries when their pipe loaded trucks rolled over after they lost control of their vehicles. The highway is a paved, wide road that was used for hauling pipes from the Pisco Port to pipe yards along the pipeline route. Despite being paved, the road presented many challenges for drivers, including high altitudes (up to 4,900 meters above sea level), steep slopes, narrow ridges, and multiple curves. As a result of the investigation, PLNG introduced corrective action, training, and incentive programs to reinforce and continuously improve upon its culture of worker safety. By regularly engaging with the workforce on safety issues, PLNG reduced the DIR to 2.46 by 2011, and to zero by 2012.

Based on the accidents mentioned above, PLNG implemented the following safety measures: (i) a new risk assessment for the highway; (ii) additional Global Positioning Service (GPS) controls in vehicles; and (iii) additional road safety supervisors and checkpoints. By investigating and learning from drivers' incidents, the company created a culture of safety over time by introducing new management controls and awareness programs. The due diligence taken by PLNG to improve driver safety is a sound example of the company taking steps that went beyond the requirements of the 2006 Performance Standards.[11]

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[7] See Performance Standard 4 (2006), Paragraph 1.

[8] Peru Has Third Highest Death Rate for Traffic Accidents in the World," *Latino Daily News*, December 21, 2010. http://www.hispanicallyspeakingnews.com/notitas-de-noticias/details/peru-has-third-highest-death-rate-for-traffic-accidents-in-the-world/3909/ (based on translation of Peruvian RPP news article).

[9] DIR = (Number of vehicle accidents * 1,000,000)/ kms driven.

[10] PLNG Monthly Environmental and Social Progress Report, September (2008).

[11] Driver safety was explicitly addressed in the 2012 edition of the Performance Standards. See Guidance Note 4 (2012), Paragraph 11.

Through a process of investigation and continuous improvement, PLNG learned the following lessons (1–6) on improving driver safety.

Lesson 1: Implement an organizational framework to address driver safety and support the overall environmental and social risk management system

Good environmental and social risk management systems cannot manage themselves—it takes talented people to do so.[12] During pipeline construction, PLNG instituted a driver safety accountability framework. As part of this framework, seven teams performed responsibilities as outlined in Table 1.

TABLE 1: DRIVER SAFETY ACCOUNTABILITY FRAMEWORK

TEAMS	RESPONSIBILITIES
Safety Department	• Conducted monthly meetings with Peruvian Health & Safety (H&S) Agency of Energy and Mines to discuss H&S plans, results of investigations, and action plans • Investigated incidents
Health & Safety Team	• Rewrote transportation subcontractor contract • H&S supervisors received "H&S Incident Investigation" specialized training • Held accident investigation lessons learned discussions
Community Relations Team	• Held road safety information workshops • Gathered perceptions of local people about road-related issues, such as transport of pipes between pipe yards and work fronts • Provided feedback loop for the safety department on grievances related to traffic safety
Traffic Safety Committee	• Consisted of representatives from PLNG, the primary construction contractor, and the transportation subcontractor • Addressed problems that caused workplace accidents, illnesses, and injuries • Adhered to Peruvian safety regulations for hydrocarbon activities and the guidelines established in the PLNG Environmental, Social, Health and Safety Management System documents • Met on a monthly basis to discuss project safety risks • Analyzed the risks that could affect driver safety and awareness and as a result created two action plans: one focused on management controls, and the other focused on raising driver and community safety
Safety Managers	• Monitored driver speeds using GPS devices • Oversaw creation of road risk maps
Road Supervisors employed by the Primary Contractor	• Monitored all vehicles along the Via de los Libertadores Highway and pipeline route • Used radar guns to monitor drivers' speed • Regularly inspected vehicles in transit for issues compromising safety • Ensured the road risk map was regularly updated • Monitored driver meal choices
Drivers	• Participated in mandatory driver training sessions • Monitored their own speed • Reported hazards or inappropriate behaviors witnessed

[12] See Performance Standard 1 (2006), Paragraph 17: "The client will establish, maintain, and strengthen as necessary an organizational structure that defines roles, responsibilities, and authority to implement the management program, including the Action Plan. Specific personnel, including management representative(s), with clear lines of responsibility and authority should be designated. Key social and environmental responsibilities should be well defined and communicated to the relevant personnel and to the rest of the organization. Sufficient management sponsorship and human and financial resources will be provided on an ongoing basis to achieve effective and continuous social and environmental performance."

Lesson 2: Implement management controls to enforce driver safety

At the recommendation of the PLNG's Traffic Safety Committee, PLNG instituted the following management controls to enforce driver safety:

"GPS only shows you the history—you can see what happened. Radar guns can show you what is happening in the moment, in real time. Also, because the drivers know that supervisors have radar guns, they help with enforcement."

– Domingo Yi, PLNG Health & Safety Manager

Speed Controls: PLNG posted clear warning signs and traffic signs indicating the speed limit along the Via de los Libertadores Highway and unpaved roads in the highlands. PLNG also posted public bulletins and banners with the tagline "Road Safety Is No Accident." In addition, safety managers monitored driver speeds through GPS devices in driver vehicles, and road supervisors utilized radar guns (Figure 3) to monitor driver speeds.

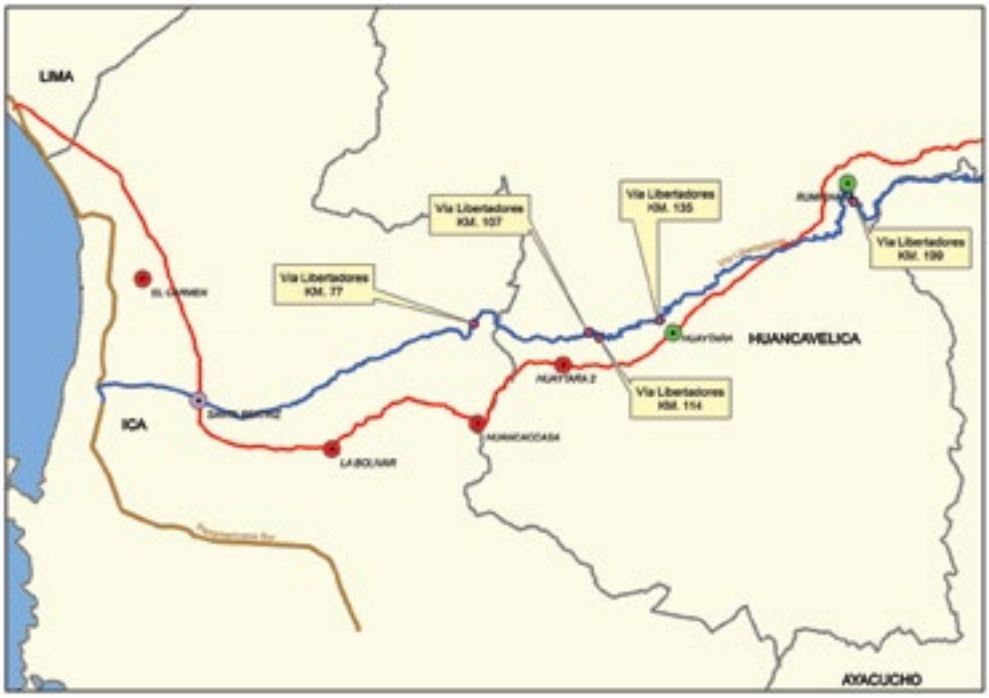
Risk Maps: PLNG conducted a risk assessment of the roads used by project vehicles and created a map highlighting high-risk areas such as winding roads, open trenches, or areas heavily traveled by pedestrians. In addition to a print out of the risk map, PLNG provided drivers with an electronic version that synchronized with the GPS system and indicated high-risk travel areas, helping them prepare their own route plans.

Mandatory Driver Training: Mandatory driver training sessions included an explanation of the risk map and how to use it, techniques for driving loading trucks and four-wheel drive vehicles, and tips for driving on winding roads.

Checkpoints: PLNG set up five checkpoints, each manned by a road supervisor, along the Via de los Libertadores Highway (see Figure 4). Three of the checkpoints (3, 4 and 5) were located close together in an area considered highly dangerous because of the altitude, multiple curves, and weather conditions.

FIGURE 3: PLNG ROAD SUPERVISORS USED RADAR GUNS TO MONITOR DRIVERS' SPEEDS

FIGURE 4. VIA LIBERTADORES CHECKPOINTS (SEE MARKED POINTS AT KMs 77, 107, 114, 135 AND 199 ON THE HIGHWAY)



Drivers were required to stop at all checkpoints, where road supervisors performed:

- Overall health and fatigue checks
- Safety inspections of vehicles
- Inspections of the vehicle loads
- Oxygen level and arterial pressure tests—road supervisors checked drivers' blood pressure at each checkpoint. They monitored oxygen levels before drivers began to ascend from the coast to higher altitudes, and then again at higher altitudes, keeping a record of changes in oxygen levels.

The checkpoints also provided services such as drinks, rest facilities, and health assistance if necessary.

Alcohol Testing: PLNG follows a zero tolerance policy on alcohol consumption and performs random alcohol tests on drivers. While Peru's national legal blood alcohol concentration (BAC) limit for driving is 0.5,[13] the limit in the project is zero; and any driver who fails the test is automatically dismissed.

Driver Safety Meetings: PLNG held mandatory driver safety meetings on a monthly basis during the construction phase of the project.

Road Safety Observation Program: To complement the zero tolerance policy, PLNG introduced a road safety observation program for the construction phase of the project. PLNG's Safety Department distributed safety observation cards to all employees involved in transportation and encouraged them to report risky actions or conditions. Based on their observations, employees ticked boxes on the card to indicate issues that contributed to accidents. These ranged from

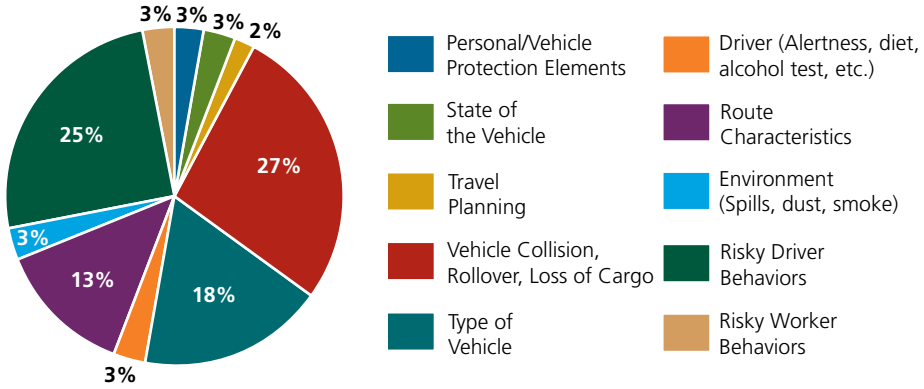
[13] BAC is the amount of ethanol in a given volume of blood, measured as "weight by volume." For a comparison of BAC limits worldwide, see http://www.icap.org/table/BACLimitsWorldwide.

personal/vehicle protection elements (e.g., use of seatbelts) to route characteristics (e.g., landslide-prone). Data collected from these observation cards over 2008–2009 showed two major areas of risks: 27% of accidents involved collisions, roll-overs, and lost cargo, while 25% of accidents were due to risky driver behaviors, including abuse of vehicle equipment, inadequate protective elements, and general risk-taking behavior (see Figure 5). These observations helped verify vehicle conditions and road conditions, and alerted supervisors to risky behaviors and situations.

FIGURE 5: DATA FROM ROAD SAFETY OBSERVATION CARDS (PERCENTAGES ARE BASED ON A TOTAL OF 1190 CARDS COLLECTED FROM JUNE 2008–DECEMBER 2009, SOURCE: PLNG)

"Everyone has to be aware every day."

– Domingo Yi, PLNG Health & Safety Manager



Every month, PLNG's Safety Department presented the road safety statistics to the Safety Committee. The committee discussed the results of the different components of the road safety program, including records from safety observation cards. Based on the discussion and findings, specific action plans or activities were developed. Examples included re-training employees on safe driving practices, installing additional safety warning signs along roads, and disseminating information regarding previous incidents.

Lesson 3: Engage with communities on safe driving practices

In parts of Peru, pedestrians make up 80% of traffic deaths even though the country has only 100 vehicles per 100,000 inhabitants.[14] During the construction phase of the pipeline, PLNG engaged with local communities to conduct regular road safety training sessions to raise awareness on road hazards and the importance of following safety rules near roads. For example, a road safety information workshop was held with 70 attendees during the second quarter of 2009.[15] PLNG ensured that the awareness raising program was appropriate to the local context.[16] For instance, in the Andean highlands training sessions were conducted in Quechua, the local language. The training sessions were conducted by staff with local knowledge and who were selected by the project's primary construction contractor. Trainers utilized a variety of materials including signs (using the Spanish alphabet because Quechua has no official alphabet) and cartoon drawings.

[14] Babara Fraser,"Pedestrians at Risk in Peru," *The Lancet*, 377 (2011): 543-544. http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(11)60185-2/fulltext

[15] PLNG Quarterly Environmental and Social Progress Report, Quarter 2 (2009).

[16] See Performance Standard 1 (2006), Paragraph 19. "Community engagement will be free of external manipulation, interference, or coercion, and intimidation, and conducted on the basis of timely, relevant, understandable and accessible information."

Lesson 4: Consider innovative ways to improve driver safety and health

After discovering that road accidents occurred when drivers at high altitudes became drowsy after consuming carbohydrate-rich meals, PLNG introduced a driver food monitoring program. In this program, PLNG collaborated with local roadside restaurants to provide drivers with balanced meals high in protein and iron, and low in carbohydrates and calories. Road supervisors monitored drivers' meal choices in coordination with the transportation sub-contractor and approved restaurants.

The food monitoring program accompanied a healthy diet awareness campaign. PLNG distributed brochures to drivers providing advice about healthy food choices and how to reduce fatigue (see Figure 6). These brochures include recommendations to drink 2 to 3 liters of water per day and to rest when necessary.

> "We researched 'What is the right food for these conditions?' Of course the drivers were upset at first, but we now have an 80–90% compliance rate."
>
> – Domingo Yi,
> PLNG Health & Safety Manager

FIGURE 6. HEALTHY FOOD CHOICES BROCHURE FOR DRIVERS

Lesson 5: Ensure that safety policies are also followed by third-party contractors

- *Elements of contractor management should be included in the bidding documentation (Request for Proposals) before the lead contractor is selected*

PLNG contracts had been awarded to third-party contractors without specifying that the contractors would need to demonstrate a safety management system. Recognizing that driver safety of contractors was a risk to be addressed, PLNG later modified contractual requirements to include driver safety as a component. The modifications came at a cost to PLNG. Costs included

introducing new mitigation measures as well as awareness programs and management controls to improve conditions for drivers. Though driver safety was not required of non-employee workers under the 2006 Performance Standards, the steps taken by PLNG demonstrated the company's commitment to go beyond these requirements.

- *Ensure that the contract with the local transportation company includes a detailed driver management section*

On many oil and gas projects, the primary construction contractor relies on a local transportation sub-contractor to provide trucks and drivers. The company sponsoring the oil and gas projects takes on risk by relying on the primary contractor to carefully manage the sub-contractor. In the case of PLNG, the primary contractor had signed a contract with a local transportation sub-contractor without PLNG's oversight. This contract did not include a driver management section with detailed information about controls. The PLNG Health and Safety team rewrote the contract to ensure that it clearly expressed the company's expectations of its drivers. Ideally, the local transportation sub-contractor contract should detail all controls and checkpoints and include information about oxygen and alcohol tests.

This experience demonstrates that it is necessary to carefully manage sub-contractors to safeguard the project, the drivers, and affected communities against risks. It is also crucial that third-party contractors follow all of the project's safety procedures. PLNG holds Environment, Health and Safety meetings for contractors on site every month to discuss and review PLNG's Health, Safety and Environment requirements and policies with all contractors.

Lesson 6: Reward drivers for on-time delivery without incident

Following two September 2008 driver incidents, a PLNG Safety Department investigation revealed that the driver incentive program prioritized time over safety—drivers were rewarded when they delivered cargo on time but there was no incentive to deliver cargo safely or without incident. Given the unpredictable road conditions in the region, drivers often rushed to catch up on lost time, leading to speeding and accidents.

As a result of the investigation, PLNG replaced its incentive system with one that rewards drivers for safely delivering their cargo on time. PLNG began holding awards ceremonies at monthly driver safety meetings, where drivers were publicly recognized for their safety efforts including:

- Number of kms driven without incidents
- Best road safety observation report
- Best behavior observed during inspections

Drivers were rewarded with items such as backpacks, but the primary incentive was recognition in front of their peers. By placing safety concerns ahead of short-term cost or time savings, PLNG's management demonstrated a willingness to shift the overall emphasis from a short-term focus to a long-term emphasis on building a culture of safety observed by all project employees.

II. Summary of Lessons

Lesson 1

- Implement an organizational framework to address driver safety and support the overall environmental and social risk management system

  Introduce an accountability framework with relation to driver safety, specifying the roles and responsibilities of all stakeholders, from drivers to Community Relations to the Safety Department.

Lesson 2

- Implement management controls to enforce driver safety

  A zero tolerance policy includes zero tolerance towards drinking alcohol and speeding, enforced by road supervisors at checkpoints.

Lesson 3

- Engage with communities on safe driving practices

  Support management controls with a community engagement strategy that includes regular community meetings and materials to raise public awareness. In the case of this project, workshops and trainings were held to engage local community members on driver safety, and, where needed, these trainings were conducted in the local Quechua language.

Lesson 4

- Consider innovative ways to improve driver safety and health

  Consider creative ways to address driver safety, such as implementing a food monitoring program, to ensure drivers are not consuming foods that may contribute to fatigue.

Lesson 5

- Ensure that safety policies are also followed by third-party contractors

  All elements of contractor management should be included in the bidding documentation (Request for Proposals) before a prime contractor is selected. The contract with the transportation subcontractor should also include detailed driver safety provisions.

Lesson 6

- Reward drivers for on-time delivery without incident

  Implement an incentive system prioritizing safe delivery of goods over time saved.

III. Labor and Working Conditions: Lessons Learned from Stakeholder Engagement in Local Hiring

IFC investment clients provided 2.5 million jobs in 2011, up from 695,000 in 2006.[17] However, achieving development effectiveness is not only about the quantity of jobs created—it is also about ensuring that job creation reflects protection of basic rights of workers. For any business, its workforce is perhaps its most valuable asset.

Performance Standard 2: Labor and Working Conditions recognizes "that the pursuit of economic growth through employment creation and income generation should be balanced with protection for basic rights of workers. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention, and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, clients may create tangible benefits, such as enhancement of the efficiency and productivity of their operations."[18]

THE CHALLENGE: PLNG recognized that one key reason that communities support large infrastructure projects is the expectation of employment. Failure to meet or address that expectation can put support for the project at risk. In the case of PLNG, the communities targeted for local hiring priority were those located along the pipeline Right of Way (RoW). PLNG's early stakeholder engagement activities clearly indicated that communities desired as much project employment as was available to them.

THE APPROACH: To establish and foster a constructive worker-management relationship with the local communities as required in Performance Standard 2, PLNG implemented a successful Local Hiring and Purchasing Plan to support construction of the pipeline and the plant facilities.[19] The success of this plan was driven by PLNG's engagement with local stakeholders on equitable hiring processes and by communicating clearly about this process to affected communities. To meet the needs of the project and the communities through which the pipeline passed, PLNG developed hiring guidelines. The construction company—a third party—hired members of the community situated in areas through which the pipeline passed for the duration of the construction process in each area. Once work was completed in one area, residents of the next communities were hired.

During the construction phase of the pipeline (2008–2010), PLNG created approximately 30,000 jobs, directly and indirectly.[20] At the peak of construction in 2009, the project employed 10,675 workers, 90% of whom were Peruvian.[21] Out of these Peruvian workers, more than 50% were skilled laborers. All of the unskilled workers hired during construction were from project-affected communities; more than 5,600 from two towns near the plant, Chincha and Cañete, and more than 4,000 from communities located near the pipeline. While communities voiced concern, and at times protested when the employment opportunities ended (with the completion of construction),

[17] See IFC Annual Report 2012, Results Section, Page 4.
[18] See Performance Standard 2 (2006), Paragraph 1.
[19] For further details on the Local Hiring and Purchasing Plan, see http://www.ifc.org/ifcext/spiwebsite1.nsf/0/00DB06A86B84D253852576BA000E2AF0/$File/Local%20Hiring%20%20Purchasing%20Plan.pdf
[20] Direct jobs are the employment opportunities specifically created for qualified employees by the project, while indirect jobs are jobs that happen to arise in a project area.
[21] Please note that this figure includes contractors as well as direct PLNG hires. Source: PLNG Frequently Asked Questions: https://portal.perulng.com/irj/go/km/docs/documents/PLNG%20Website/English/Static%20Content/WSiteV2_ENG/faqPopUp_ENG_WSiteV2.html

closure audits conducted at the end of construction indicated that communities were pleased to have had work and voiced strong approval of PLNG's management of local employment.

Continuous stakeholder engagement allowed PLNG to involve communities in the hiring process and maintain open channels of communication. PLNG clearly communicated the number of potential job openings to local communities to avoid raising expectations. For the plant construction, an even number of workers was hired from both neighboring provinces to ensure to minimize conflict over available work. PLNG's contractors were required to follow PLNG's Local Hiring Plan as part of the contracting process, demonstrating clear management of third-party contractors. Ongoing, fluid stakeholder engagement allowed PLNG to modify its local hiring guidelines as appropriate through a process of continuous improvement.

PLNG learned the following lessons (7–10) while engaging with communities in order to effectively implement a local hiring plan.

Lesson 7: Manage expectations by clearly communicating employment opportunities with communities, addressing grievances, and encouraging community participation in the selection process

Clearly communicate the number of available jobs to local communities

PLNG demonstrated ongoing and fluid engagement with communities regarding hiring guidelines and opportunities.

- PLNG clearly communicated the number of potential job openings to local communities to avoid raising expectations. The pipeline construction contractor provided PLNG with its hiring needs nearly one month prior to the start of the construction phase. After receiving the contractor's hiring needs, PLNG's Community Relations personnel met with each community to explain the hiring needs and timeline. During these meetings the representatives clarified the number of job candidates the project could include as part of the unskilled work force according to the requirements of the particular phase (construction or operations/maintenance).

"It's very important to have a clear message that work is temporary."

- Julio Rojas, PLNG Manager of Community Relations

- To maximize the number of opportunities available to local communities, PLNG created three-month temporary positions for unskilled laborers and clearly communicated the temporary nature of these positions. The three-month rotation was recommended based on community consultations conducted prior to the construction phase. PLNG's Community Relations team coordinated with the construction contractor and local communities to monitor the agreed rotation schedule.

- Communication between stakeholders and project representatives took place regularly. The PLNG Community Relations team, made up of 22 Peruvian personnel, including Quechua speakers, established a relationship with the communities.

- The Community Relations team held regular induction talks for local workers to explain work policies and procedures.

On a case-by-case basis, PLNG allowed local communities to make small changes to hiring procedures as part of a continuous improvement process. In this light, some communities took the initiative to band together to strengthen their negotiating power and become more attractive for hiring. For example, in Chiara, Ayacucho, six communities joined together, forming a 20 km hiring zone. They elected a president in charge of negotiations with PLNG and installed a workers' camp in the hiring zone. For PLNG's contractor, the benefits of this arrangement was a workforce that was not limited to one small zone and was therefore more mobile.

Encourage community participation in the selection process for unskilled workers

The Local Hiring and Purchasing Plan was implemented by the lead construction contractor in close coordination with the PLNG Community Relations team, and addressed traditional decision-making mechanisms and cultural differences, particularly in the Andean highlands. The Community Relations team provided communities with clear hiring criteria. Community boards prepared a list of job candidates and, at the request of the Community Relations team, held a community assembly to present their candidates (often 20% more than requested). The candidate list was validated in the assemblies and submitted to the pipeline contractor via the Community Relations team. The construction contractor selected workers from the lists provided by the communities. This process ensured community participation in hiring outcomes. Additionally, PLNG's quarterly internal environmental and social pipeline audits verified that unskilled workforce recruitment was consistent with community agreements. PLNG made changes to its existing recruitment system to ensure this compliance.

Through a process of continuous improvement aided by internal audits and regular reporting, PLNG was able to ensure that local hiring practices matched the agreements the company made and that these practices were communicated to communities.

Implement a mechanism to address work-related grievances

PLNG provided a grievance procedure[22] for communities as part of the overall ESMS, with special considerations for the pre-construction, construction, and operational phases. Complaints could be submitted at PLNG offices, by phone or internet, and through suggestion boxes located in the communities. PLNG also established public information offices in Chincha and Cañete in August 2005 to address stakeholder issues. Local workers regularly visited these offices to inquire about job opportunities. For example, during the fourth quarter of 2008, during construction, 1,395 office visits were recorded, including 742 in Cañete and 653 in Chincha. The most common inquiries were related to job inquiries (633), fishermen's compensation (572),[23] and general consultations (145).[24] PLNG tracked and reported on these figures (one of their key performance indicators) to ensure transparency and equity.

The Community Relations team registered labor-related grievances from the local population, filing them and responding to them in turn. The team also monitored the actions stemming from community grievances and ensured that responses and actions were timely. As specified in PLNG's Local Hiring and Purchasing Plan it was the responsibility of the employer's human resources organization to resolve issues in compliance with project standards and applicable labor regulations while coordinating with PLNG's Community Relations department.

[22] IFC requires all clients to establish a grievance mechanism to receive and facilitate resolution of affected communities' concerns and grievances, as detailed in Performance Standard 1, Paragraph 35. For PLNG's full grievance procedure document. see http://www.ifc.org/ifcext/spiwebsite1.nsf/0/00DB06A86B84D253852576BA000E2AF0/$File/Grievance%20Procedure.pdf

[23] Fishermen's associations were compensated for the possible financial impact that could result from the marine terminal/marine safety zone, which covers 1.3 kms of the coast and up to 2 kms offshore. PLNG financed business projects proposed by the fishermen rather than cash payments.

[24] PLNG Quarterly Environmental and Social Progress Report, Quarter 4 (2008).

Lesson 8: Engage with communities and hire proportionate numbers from communities in the project vicinity, where possible, to avoid perceptions of unequal treatment

Hiring proportionately from nearby communities can prevent accusations of bias or conflict. In an agreement with elected officials and local communities, PLNG hired unskilled workers for the plant and quarry in proportionate numbers from the nearby towns. The number of unskilled laborers hired from each community depended on the size and boundaries of each community as well as the contractor's needs.

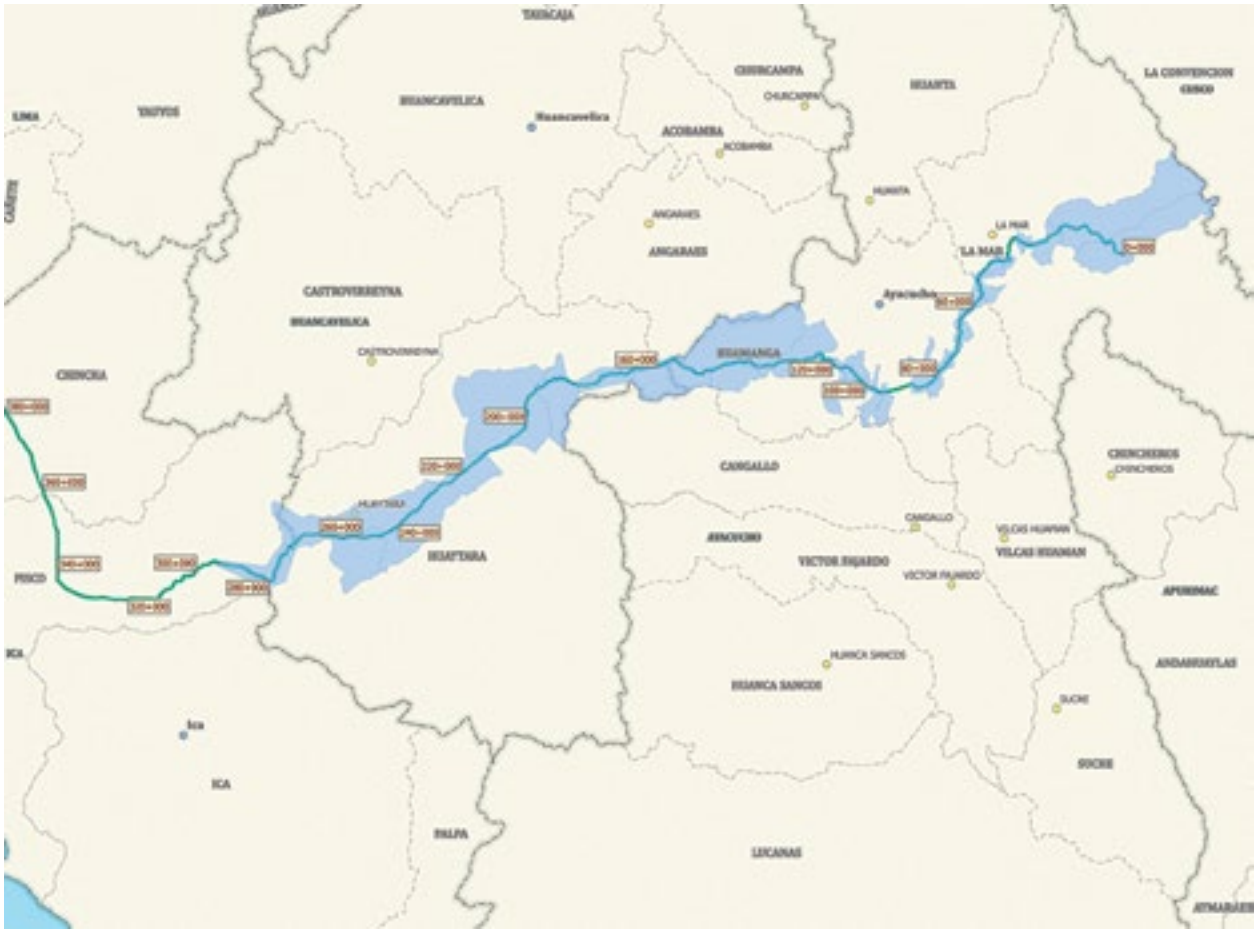
There are two examples in particular where, by engaging with local communities, PLNG successfully avoided conflict. The surrounding towns of Chincha and Cañete both wanted to claim that the PLNG plant was located in their territory; however, there was disagreement on the boundaries of both towns. By engaging with the towns to clearly define boundaries, and in agreement with plant and marine contractors, PLNG successfully implemented proportionate hiring of workers from each town (see Table 2). To ensure unskilled positions were appropriately distributed among local villagers, the Community Relations team informed the contractor of the boundaries of each community (i.e., from km 23 to km 45 along the pipeline).

TABLE 2. LOCAL HIRING: CHINCHA AND CAÑETE, 4TH QUARTER, 2008 (SOURCE: PLNG)

DESCRIPTION	OCTOBER 2008	NOVEMBER 2008	DECEMBER 2008
Plant Contractor *Total Hires*	962	1,127	1,126
Chincha	454	548	524
Cañete	508	579	602
Marine Contractor *Total Hires*	238	234	236
Chincha	128	123	120
Cañete	110	111	116
TOTAL	**1,200**	**1,361**	**1,362**

In another example, at Chiquintirca (kms 0 to 6 of the pipeline—see Figure 7), which is a transition between the Andean region (Sierra) and the Amazon (jungle) region, the Sierra inhabitants near the pipeline opposed job opportunities for jungle inhabitants, arguing that they were not affected by the project. The jungle residents in turn argued that they had not been entitled to easement compensation, so they deserved jobs. PLNG worked to provide opportunities for all affected communities and community members and to overcome any residual ill will through small-scale social investment programs.

FIGURE 7. COMMUNITY BOUNDARIES MAP



Lesson 9: Provide preferential hiring to local skilled workers

Although unskilled workers represented a proportion of local hiring, PLNG provided preferential hiring for local workers who were skilled and semi-skilled, based on the contractors' lessons learned on previous pipeline projects.[25] The contractor's preference was to use local workers with skills such as welding and engineering, because they found that it was cheaper to hire locally and it also helped build a positive relationship with local communities. The contractor maintained a list of local workers with certain skills from the previous project and also coordinated with local technical colleges and municipalities to find skilled workers.

Skilled workers tend to be more fungible—meaning, they may be transferred to other work areas by the project outside of their local community. If and as these types of transfers occur, it is important to articulate to local communities why the transfer is occurring. Communities may be displeased if they find that the project has hired a skilled worker from another town or region. The Community Relations team addressed these issues on behalf of PLNG.

[25] According to Performance Standard 2 (2006) Paragraph 17: "Special measures of protection or assistance to remedy past discrimination […] will not be deemed as discrimination, provided they are consistent with national law." Guidance Note 2, paragraph 47 (2007) states: "Projects may have objectives to promote the employment of the local community within the project. Where this is done in accordance with national law, this will not be taken to infringe the principles of this paragraph."

Lesson 10: Based on community engagement, decide on an appropriate skills training program for local hires

To create a broader talent pool and provide long-lasting benefits, companies should also consider providing training for less skilled workers before construction commences. PLNG worked with the available skilled workers and provided training to unskilled workers once construction began, but the company did not conduct job skills training up front. PLNG could have benefited from a broader talent pool had they provided this training in advance. However, one drawback of an early training program is that it can create more expectations. Doing an early training program requires clear communication of the opportunities that will be available after training.

Providing technical training opportunities throughout construction is also valuable because it helps local workers develop transferable skills. PLNG's primary plant contractor carried out a technical training program to help workers from local communities advance their technical skills in areas such as welding, carpentry, digger operations and scaffolding. For the operations phase of the plant, PLNG trained the first group of liquefied natural gas plant operators in South America. These 48 Peruvians obtained their international certification in 2009. This was accomplished through a partnership with TECSUP, a Peruvian institution providing vocational education and training. The workers were trained for two full years during construction, so that once the plant began to operate they would be highly skilled and ready for work as plant operators. The TECSUP training program was designed specifically to prepare these trainees to begin working at the plant once construction was complete, and the international certification also provided them with highly transferable skills. Each company must decide on an appropriate vocational skills training plan based on their engagement with communities.

III. Summary of Lessons

Lesson 7

- Manage expectations by clearly communicating employment opportunities with communities, addressing grievances, and encouraging community participation in the selection process

  Clearly outline job expectations and rules. Broaden job opportunities, where possible, by rotating job opportunities.

Lesson 8

- Engage with communities and hire proportionate numbers from communities in the project vicinity where possible to avoid perceptions of unequal treatment

  As much as possible, distribute job opportunities equitably to head off potential conflict.

Lesson 9

- Provide preferential hiring to local skilled workers

  It is more cost-effective to hire locally and it also helps build a positive relationship with local communities. Contractors may also benefit from maintaining a list of skilled workers from previous projects.

Lesson 10

- Based on community engagement, decide on an appropriate skills training program for local hires

  Consider pre-construction training for unskilled workers to widen the pool of available skilled workers and/or provide advanced technical training opportunities to allow workers to develop transferable skills.

IV. Biodiversity Conservation: Lessons Learned in Implementing a Mitigation Hierarchy

Companies face continued pressure from outside investors, customers, trading partners, shareholders, governments, civil society and the public to identify and report on their environmental and social performance, and biodiversity is a key area of interest.[26] This is particularly true of oil and gas activities in remote, high-biodiversity areas, such as in the PLNG context. These projects can introduce the potential for induced impacts from increased access to previously undeveloped areas along pipelines and roads. These linear developments can induce in-migration and potentially fragment habitats, posing increased threats to biodiversity.[27]

Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management "recognizes that protecting and conserving biodiversity—the variety of life in all its forms, including genetic, species and ecosystem diversity—and its ability to change and evolve, is fundamental to sustainable development."[28] The Standard further provides that "…to avoid or minimize adverse impacts to biodiversity in the project's area of influence, the client will assess the significance of project impacts on all levels of biodiversity as an integral part of the Social and Environmental Assessment process. The Assessment will take into account the differing values attached to biodiversity by specific stakeholders, as well as identify impacts on ecosystem services."[29]

THE CHALLENGE: PLNG was carried out in an area that is sensitive to biodiversity risks, as it contains a number of sensitive species and habitats. This required management plans and approaches to avoid or reduce potentially negative impacts to the environment as required by Performance Standard 6.

THE APPROACH: The project addressed biodiversity risks by implementing a mitigation hierarchy that was continually adjusted based on an adaptive management approach. The mitigation hierarchy seeks foremost to avoid negative impacts on biodiversity. If they cannot be avoided, companies should put in place impact reduction or mitigation measures, and, if applicable, biodiversity offsets.

Adaptive management was exemplified by PLNG's iterative approach to implementing the mitigation hierarchy to protect biodiversity and manage project-related impacts. Adaptive management is a systematic process for continually improving management policies and practices. It requires the implementation, monitoring, and evaluation of results, and adjustment of objectives and practices.

The Environmental and Social Impact Assessment (ESIA) data collection process required by Performance Standard 1 provided an environmental baseline and impact analysis within a 3–7 km wide pipeline corridor. Recognizing that more detailed surveys were required to better understand the biodiversity values within the RoW of the pipeline, PLNG's environmental group, with the help of third-party consultants, conducted site specific studies under an Ecological Field Survey (EFS). The EFS supported the characterization of biodiversity values at the landscape level along the pipeline as an initial step in the impact assessment

[26] See "IFC's Guide to Biodiversity in the Private Sector" (IFC, 2006). http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/biodiversityguide

[27] See "Good Practice Handbook Projects and People: A Handbook for Addressing Project-Induced In-Migration," (IFC, 2009), page 46. http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_inmigration__wci__1319576839994

[28] See Performance Standard 6 (2006), Paragraph 1.

[29] See Performance Standard 6 (2006), Paragraph 4.

and management process. From this identification of biodiversity values, PLNG developed an Ecological Management Plan and specific Contractor Ecological Management Plans to manage impacts during construction. PLNG used an iterative process to develop and continually improve environmental management plans based on research findings, science-based monitoring, and repeated assessment.

PLNG learned the following lessons (11–15) in the course of applying a mitigation hierarchy based on a process of adaptive management to address biodiversity risks.

Lesson 11: Route selection for the pipeline corridor is the key to avoiding negative impacts on biodiversity, communities, and sites of cultural heritage

Applying the mitigation hierarchy requires knowledge of the potentially affected environment in order to design appropriate measures to avoid and minimize impacts. Projects should seek foremost to avoid impacts, and this is clearly stated in Performance Standard 6. The PLNG project includes a 408 km pipeline from the Andes Mountains to the Pacific Ocean. Considering options for the pipeline corridor early on was one of the most critical measures taken to avoid negative impacts on biodiversity and local communities. The iterative information-gathering process enabled PLNG to consider these issues early on and incorporate this into the design decision making process for appropriate avoidance or management.

As part of this process, in 2004 PLNG conducted a preliminary desktop evaluation of the pipeline corridor and commissioned a number of studies conducted along the pipeline route, from corridor selection studies to site-specific studies. PLNG took into account four key areas: biological sensitivity, geomorphology,[30] archaeology and social issues. Considerations included:

- Diversity of the mosaic of habitat types
- Presence of Andean wetlands and small lakes
- Presence of protected areas
- Presence of communities
- Presence of archaeological sites[31]
- Presence of mammals and plants with a restricted distribution in the area
- Presence of areas of bird endemism

As a result of the desktop review, PLNG identified two possible pipeline routes:

- The **Parallel Route** (Southern Route): This route would be parallel to an existing gas pipeline operated by the Transportadora de Gas Del Peru (TGP) consortium[32] carrying natural gas from Camisea fields to the coast for two major sections: (i) from Vinchos (km 83) to km 280 and (ii) from km 340 to the liquefaction plant. This route benefitted from better access for construction crews due to the Via de los Libertadores Highway.

[30] Geomorphology is the study of the characteristics, origin, and development of landforms (Dictionary.com).
[31] See Performance Standard 8: Cultural Heritage (2006) for additional information.
[32] Argentina's Tecgas and Pluspetrol, U.S.-based Hunt Oil, Algeria's Sonatrach, South Korea's SK (096770.KS) and Peru's Grana y Montero (GRA.LM) are part of the TGP consortium.

- The **Direct Route** (Northern Route): This route would follow an approximate straight line from the pump station to the plant at a length of 315 km. It would traverse about 320 km of rocky terrain at very high altitudes of more than 4,000 meters, with few access roads and bridges. This route would also require a descent to the coast through the Topará Ravine, where there are irrigation channels, agricultural land and many archaeological sites.

To further refine the pipeline corridor proposal to ensure impacts on biodiversity were minimized, following desk review, PLNG conducted a detailed terrain analysis utilizing aerial reconnaissance. This resulted in a number of modifications.

- Alternate routes were combined into one route from km 0 to km 48 of the pipeline.

- In reviewing the Parallel Route and the Direct Route further, specialists identified five problem zones that were difficult to traverse on the Direct Route and required significant rerouting:
  - Rio Chiris Valley: Approximately 3 km of extremely steep/rocky slopes
  - Rio Tantara Valley: 7 km of extremely steep/rocky slopes
  - Cabrada Jerucancha Valley: 3 km of steep slopes through the valley
  - High Plateau and Narrow Ridge Area: 17 km of archaeological sites including an old Inca city registered as an archaeological reserve
  - Narrow Ridge Route: Multiple archaeological structures and archaeological surface evidence[33]

- After further study, the Parallel Route was selected because of the many challenges of the Direct Route. Also, because much of the route is identical to the existing pipeline route, PLNG benefited from the experience gained during the construction of the TGP pipeline and the presence of existing access roads and efficiency in logistics.

- The project incorporated environmental, social, geological, and archaeological recommendations based on further studies to fine-tune the Parallel route, resulting in the Modified Parallel Route (see Figure 8).

FIGURE 8. THE MODIFIED PARALLEL ROUTE, ORIGINAL (GREEN), MODIFIED (BROWN)

[33] Simon Maguire, "PLNG Systematic Approach to Pipeline Route Selection," (unpublished, 2006).

- **ESIA:** Following the terrain analysis, the ESIA process for the Modified Parallel Route commenced in November 2005. The ESIA helped establish a baseline, while site-specific studies enabled a more detailed picture of the environment so that micro-routing could take place.

- **Site-Specific Studies:** In 2005–2006, PLNG undertook site-specific studies. A team of six biologists, six archaeologists and two physical scientists walked the Modified Parallel Route, compiling topographic maps, developing initial alignment sheets mapping out the route, conducting an archaeological investigation, and mapping river crossings, wetlands and springs. The team identified "red flags" and established a detailed picture of the environment to allow for further refinements, known as micro-routing.

- **Micro-routing—Identifying and Avoiding Environmentally and Socially Sensitive Areas:** In total, 62 micro-routing refinements to the Modified Parallel Route were incorporated based on site-specific studies. Micro-routing changes ranged from minor adjustments to deviations of several kms. Unless deemed technically unfeasible, route revisions were accepted immediately by geotechnical specialists during the site specific studies and incorporated into the corridor route.

Revisions were made to avoid homes, archaeological sites, and environmentally sensitive areas. For example, community consultations established that wetlands and spring water sites were important to local communities in the highlands because they were used as watering holes for domestic animals and have a strong spiritual significance. Thus, PLNG surveyed the RoW together with local communities to identify water sources that could be avoided through small route variations. They performed repeat Andean wetland and springs surveys in the wet and dry seasons of 2006 in the Ayacucho and Huancavelica departments, covering the entire RoW. Community members worked with PLNG throughout the surveys and were not only informed of the findings but also contributed to them through their local knowledge on the terrain. As part of this collaborative work, PLNG identified 55 water sources in the Highlands Region and 6 coastal sources between km 326 and km 330. Based on the findings and recommendations of these studies, PLNG chose an optimal route to avoid sensitive areas such as Andean wetlands, and river crossings, and where these could not be avoided, specific construction method statements and design considerations were taken to minimize impact on these water resources.

Lesson 12: An Ecological Field Survey can provide more precise information for biodiversity impact mitigation

As part of its impact assessment and management program, PLNG designed a biodiversity monitoring program based on the identified Ecological Landscape Units (ELUs). This provided the project with more flexibility to tailor mitigation efforts because the landscape units were not limited to the concessions of RoW. The landscape units included natural and human-managed areas. The EFS classified the environment along the pipeline into three regional watersheds and 14 unique ELUs:[34]

(i) The **Eastern Valleys Region**, consisting of temperate valleys and mountain ranges, with a range of forests, scrublands, and moist grasslands. Because of its range, this region was broken down into seven distinct ELUs.

[34] For the full PLNG EFS, see http://www.ifc.org/ifcext/spiwebsite1.nsf/0/00DB06A86B84D253852576BA000E2AF0/$File/EFS.pdf

(ii) The **High Andes Region**, consisting of cold to temperate high ridges and plains, including many Andean wetlands (*bofedales*) and grasslands. This region was broken down into three ELUs.

(iii) The **Pacific Watershed Region**, containing arid slopes, narrow ridges, sand dunes and coastal plains with sparse to no vegetation. This region was broken down into four ELUs.

Following the information obtained during the ESIA process, the project considered the EFS to be a more precise and accurate measurement of environmental sensitivity. A main objective of the EFS was to identify the most sensitive sectors and species in the vicinity of the project. Based on the EFS findings, the most sensitive ecosystems identified were the dry forest river valleys of the Apurimac and Mantaro basins, the western Andean scrublands and cactus formations, the Pisco sand plains, and the riverine ecosystems of the coastal plain. More than 1,000 species of plants and animals were identified within these ELUs, including 41 highly sensitive species not identified through the ESIA.

By narrowing down the environmental assessment beyond the ESIA to the EFS, PLNG used an iterative approach to develop management plans based on increasingly detailed and specific data on sensitive sectors and species. In the process of drafting the Ecological Management Plan, the area of focus was tightened further to 25 meters, allowing the project's environmental specialists to conduct a more detailed analysis of necessary minimization measures.

Lesson 13: Use experimental research, where appropriate, to aid restoration efforts

"At 4,000 meters and above, everything was an experiment; there was no literature available to guide us…"

- Carolina Casaretto, PLNG Environmental Coordinator

Based on the ESIA and the EFS, PLNG developed a Biorestoration Management Plan to reinstate species that were affected during the construction phase of the pipeline. This biorestoration campaign focused on erosion control and soil improvement using manure, native species translocation, and seeding. PLNG environmental experts needed to determine the best time frame for planting and translocation.

Construction of the pipeline was completed at various stages. PLNG experts were able to take advantage of areas where the pipeline was complete to experiment with reinstating uprooted species. Because of the altitude, the terrain was a new experience for PLNG and provided opportunities for research and learning. Through their experimentation, the environmental team discovered that the best window for planting and translocation was just prior to the start of the rainy season, which runs from November through January.

Experimental research also informed biorestoration at high altitudes. PLNG's environmental team experimented with five types of seeds with high germination chances: none of the seeds took root. Next, the team experimented with translocation of grasses to control erosion, replanting grasses from outside the pipeline route into the RoW. They monitored the success of this effort by measuring the distance between the grasses on each side of the pipeline, finding that the gap closed over time, indicating that the grass took root and the transplant was successful.

Lesson 14: Invest in information early on, ensuring a more complete ESIA

Monitoring acts as an important barometer of the efficacy of biodiversity impact minimization and biorestoration measures and contributes to an adaptive management framework. As a

"The assessment and design phase is a difficult time for a project, because it's a phase where there is no income, but information is worth an investment up front."

- Carolina Casaretto,
PLNG Environmental Coordinator

result, the monitoring methodology for evaluating the effectiveness and efficiency of biodiversity conservation efforts should be given careful consideration, ideally at the impact assessment phase.

The monitoring methodology provided in PLNG's ESIA required the project to measure biodiversity in the RoW and compare this to measurements at 800 and 1,200 meters away. While this methodology may have been valid for a flat coastal area, it was not applicable to a varied topography—in the Andes a point 1,200 meters away could be located in a valley while the pipeline was on a plateau.

National and international experts, including IFC, recommended the development of a research-based Biodiversity, Monitoring and Assessment Program (BMAP) after the completion of the ESIA and EFS because these studies indicated the presence of species of concern that would require evaluation and monitoring. Because the methodology in the ESIA was not suitable for the terrain, PLNG partnered with the Center for Conservation Education and Sustainability at the Smithsonian Conservation Biology Institute to develop a new monitoring methodology. To change and improve the original monitoring plan, PLNG presented a document to the Peruvian Ministry of Energy and Mines, which was accepted. The key lesson learned was the importance of carefully considering the monitoring methodology during the assessment and planning phase of a project.

Lesson 15: Employ monitoring programs to assess the effectiveness of mitigation/restoration efforts

One of the stated goals of the BMAP was to assess the effectiveness of PLNG's mitigation efforts by comparing species and habitats in impacted and non-impacted (control) areas. Results fed into management plans through a process of adaptive management.

The PLNG monitoring team and Peruvian experts developed 16 monitoring protocols for species ranging from matucana cactus from the Oroya genus to long-snouted bats and birds of the wetlands; some of these protocols generated revisions to biodiversity management plans. Monitors from the team and technical experts also held "after action reviews" after each field season, making modifications as necessary and reporting technical problems or suggestions to the company. Communication and knowledge-sharing between BMAP experts and PLNG staff occurred on a regular basis. One example of adaptive management emerged from the monitoring protocol on rodents. Based on a study of key comparators inside and outside the pipeline RoW, the monitors suggested that PLNG introduce vegetation to increase the use of the RoW as habitat. By monitoring the density of species such as rodents and lizards inside and outside the pipeline RoW, the company obtained a good indication of the success of biorestoration efforts in terms of habitat restoration.

PLNG also used monitoring programs to assess the success of restoration efforts at high altitudes. At altitudes above 4,000 meters, reinstatement times were significantly longer than at lower altitudes because the areas were less fertile. For example, after three years the RoW had not yet recovered at high altitudes, while it looked almost invisible and was surrounded by vegetation after two years at lower altitudes. This has potential implications for livelihood restoration. Close biodiversity monitoring feeds into social monitoring of restoration of areas by communities so that the company can demonstrate where the land is more or less fertile and gather a detailed biorestoration picture.

IV. Summary of Lessons

Lesson 11

- Route selection for the pipeline corridor is one of the most critical considerations with respect to avoiding negative impacts on biodiversity, communities, and sites of cultural heritage

  The investment required up front for route modifications is offset by cost savings and reductions in environmental and social risks and perceptions. It is also offset by the costs incurred by avoiding the introduction of costly mitigation plans.

Lesson 12

- An EFS can provide more precise information for biodiversity impact mitigation

  While the ESIA provides a starting point, thorough EFS can fine-tune the ecological management approach, leading to more targeted mitigation plans.

Lesson 13

- Use experimental research, where appropriate, to aid restoration efforts

  Begin this research early in areas that have already completed construction, and hone it over time by introducing new seeding and translocation techniques.

Lesson 14

- Invest in information early on, ensuring a more complete ESIA

  Investing in information before and during the ESIA process allows a project to develop more accurate and specific mitigation plans and monitoring programs.

Lesson 15

- Employ monitoring programs to assess the effectiveness of mitigation/restoration efforts

  While a monitoring program is standard practice for projects such as these, a more important aspect is the emphasis on continuous improvement and adaptive management based on the findings and feedback of monitors. In the case of PLNG, monitors may consider holding "after action reviews" after each field season, making modifications as necessary to the monitoring protocol and reporting technical problems or suggestions to the company.

V. Environmental and Social Management Systems: Lessons Learned from Participatory Monitoring

In recent years, the private sector has come to better understand the risks associated with poor stakeholder relations—and the opportunities provided by constructive ones. Across all sectors examples abound of companies that commit to systematic stakeholder engagement, and those that do not. Companies that understand the importance of engaging with affected communities and others throughout the life of the project are reaping the benefits of improved risk management.[35]

THE CHALLENGE: The PLNG project traversed 35 rural Andean communities, many in remote highland areas. Some of these communities had a negative perception of pipeline projects based on past experience. PLNG's challenge was to address community concerns on an ongoing basis and involve communities in monitoring the environmental and social risks of the project.

THE APPROACH: During the construction phase of the pipeline project (2008–2010), PLNG introduced a unique participatory monitoring program—the first such program conducted during the construction stage of a gas pipeline in Peru. This Participatory Social and Environmental Monitoring Plan (known by its Spanish acronym, PMSAP), was implemented by ProNaturaleza,[36] a well-respected local NGO with several years of experience conducting similar programs, and with technical assistance from IFC Advisory Services. PLNG valued IFC's global experience with monitoring programs, which included a program developed for the Baku-Tbilisi-Ceyhan (BTC) pipeline in Azerbaijan, Georgia, and Turkey.[37]

ProNaturaleza hired 82 members of communities along the pipeline to monitor environmental and social aspects of the project. The monitors received extensive training on environmental issues such as erosion and soil quality, waste management, and pollution prevention. Through the monitoring program, PLNG built trust with communities and relied on community feedback to improve their environmental and social performance.

PMSAP's design and feedback mechanisms evolved over time. Continuous improvements were made to PLNG's environmental and social risk management system as a result of the participatory monitoring effort. Community feedback was taken seriously by PLNG in the monitoring plan, and influenced the design of the monitoring program. Additionally, the data and design of the participatory monitoring program were continuously tested and improved. For example, PLNG analyzed the data and found that some issues occurred repeatedly in the "other issues" category on questionnaires used by monitors; this justified creating new categories to properly document them. Monitors also regularly suggested additional data point ideas to ProNaturaleza's technical team. Information gathered by monitors led to changes in action plans or the development of new PLNG action plans. In addition to reviewing the project, monitors validated all changes or responses that PLNG made as a result of the monitors' findings.

PLNG learned the following lessons (16–21) from its participatory monitoring program.

[35] See "Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets," (IFC, 2007). http://www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_handbook_stakeholderengagement__wci__1319577185063

[36] For more information, see http://www.pronaturaleza.org/pronaturaleza/presentation/

[37] For more information on the BTC Pipeline Project, see www1.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/publications/publications_loe_btc__wci__1319578699042

Lesson 16: Make the business case for participatory monitoring to achieve buy-in from company leadership

The following key points elucidate the value proposition for a participatory monitoring program.

- **Early Detection of E&S Risks:** PLNG uses participatory monitoring as an "early detection tool" to identify environmental and social risks along the pipeline route. High-risk findings are immediately reported to the company. For example, when monitors reported a geotechnical fault in the pipeline RoW at Huanccacasa resulting from a landslide, PLNG geotechnical specialists were able to respond quickly and implement the necessary remediation work.

- **Conflict Prevention:** Information captured from monitoring helps PLNG detect potential issues that may cause conflict and engage with stakeholders to prevent incidents from occurring. For example, between April and June 2009, after monitors in the Pilpichaca community (kms 195–205) determined that construction contractors were not properly using preventive measures to avoid damage while crossing streams, the company reinforced these measures to the contractors.[38] The companies' response avoided potential feelings of ill will in a community that greatly valued its water sources. Potential issues with the community remain during the operations phase. In May 2012, 24 findings were recorded, 38% of which were linked mostly to local hiring issues or community demands.[39] Luis Ramirez, who directs ProNaturaleza's monitoring program, believes participatory monitoring decreased real and perceived risks by clarifying assumptions that could have generated misunderstandings and led to potential conflict.

- **Communication:** Participatory monitoring encourages regular contact with stakeholders and provides a two-way communication tool for affected communities to voice their concerns or issues and for PLNG to convey its continued commitment to the community. The monitoring program has helped communities build a direct communication channel to resolve problems with PLNG. Monitors use local knowledge to understand and interpret community questions or issues; this is particularly valuable in areas where cultural differences create a window for potential misunderstandings.

"Thirty-seven local monitors patrol the RoW every month—that's 74 eyes looking for problems. You can either see it as a criticism or you can use it to your advantage."

– Pablo Taborga,
PLNG Environmental Manager

"The monitoring program provided an ongoing forum for the Andean communities to bring their cultural perspective to bear on potential environmental and social issues."

– Leyla Day, IFC Social Specialist

[38] PLNG Quarterly Environmental and Social Progress Report, Quarter 2 (2009).
[39] PLNG Quarterly Environmental and Social Progress Report, Quarter 2 (2012).

Lesson 17: Community feedback can continuously improve participatory monitoring program design and action plans

The continuous improvement cycle governs all stages of the participatory monitoring program, as outlined below.

- **Program Design (7-month duration)**
  During the design stage of the participatory monitoring program, PLNG and ProNaturaleza developed an Action Tracking System and checklists related to the ESIA and other commitments. Using the System, PLNG and ProNaturaleza recorded findings that PLNG addressed and resolved.

- **Program Validation**
  Before the program could be implemented, the design was validated by local communities through a series of consultations. To introduce the participatory monitoring concept, ProNaturaleza held 57 workshops in 48 locations, which were attended by a total of 1,952 participants.

- **Selection of Monitors**
  Monitors for the program were selected in community assemblies through majority voting. PLNG required the following of monitors:
  – Ability to speak Quechua and Spanish and to read and write in Spanish
  – Elementary school certificate
  – Permanent residence in the community
  – Commitment to participate in the program
  – Successful completion of final exam held after monitor training

- **Training of Monitors**
  While only 84 monitors were necessary, ProNaturaleza trained 178 monitors for backup and to create broader awareness in local communities. Classroom training included an introductory module and a brief description of the project; modules on environmental and social issues; public communication and presentations; interview tips; use of the monitoring equipment; and instruction on filling out the environmental and social questionnaires (Figure 9).

FIGURE 9. TRAINING OF MONITORS, APRIL 2009

- **Field Monitoring**
  A pilot monitoring program (known as "Monitoring Zero") was first conducted with four participants in Patibamba, Ayacucho. ProNaturaleza and PLNG tested questionnaires and equipment and resolved early issues with the program design. After the pilot, the monitoring program commenced with 84 monitors. After construction was complete, the number of monitors was reduced to 37. Monitors receive compensation for each working day, paid by ProNaturaleza.

- **Presentation of Results to the Community**
  The monitors, accompanied by the PLNG technical team, are required to present their findings and PLNG's responses every month at a community meeting.

Lesson 18: It is critical to work with a reliable and experienced implementing partner with country experience

PLNG chose to work with ProNaturaleza because the NGO had 25 years of experience supporting biodiversity conservation in Peru, and had significant experience working with companies engaged in extractive projects and with local communities in Peru. Before commencing PLNG's monitoring program, ProNaturaleza implemented environmental monitoring programs for two gas projects in Peru: a community environmental monitoring program for the Block 88/Camisea project in 2004, and another project in the Upper Urubamba River area. These were non-IFC projects. Currently, ProNaturaleza is involved in two other monitoring programs for extractive companies. ProNaturaleza's expertise in designing and implementing monitoring programs in Peru allows them to capitalize on lessons learned and benefit from the skills of experienced technical staff. For example, ProNaturaleza's local technical team members act as translators between PLNG and the monitors, relaying their concerns and ideas to the company. A strong relationship between monitors and the technical team provides a strong foundation for a successful participatory monitoring program.

> "The [monitoring] program has provided the monitors with a regional and often a national perspective."
>
> – Luis Ramirez, ProNaturaleza

A good implementing partner also provides consistency and quality assurance by allowing participants to learn from monitors in other regions. ProNaturaleza broadened monitors' perspectives by providing them with opportunities to learn from others in other parts of the country. Training workshops were originally held separately in three regions (Chincha, Ayacucho, and San Miguel), but currently the location of the training workshops rotates between the three regions every four months. The region that hosts the workshop typically prepares a presentation complemented by fieldwork. Monitors from other regions learn about monitoring procedures in different terrain, with diverse crops and varying forms of transportation (some monitors travel by horse, others by car to conduct monitoring). Because this system of knowledge-sharing allows for repeated exposure, the monitors are familiar with each other and are not shy about sharing experiences and opinions. ProNaturaleza has also organized exchange programs with different monitoring programs they are conducting in other parts of the country to broaden the monitors' exposure to a wider range of environmental and social issues.

Lesson 19: Monitors should validate company responses

The monitors report findings and also determine whether or not the company has sufficiently responded to their reports.

The reporting process begins with a baseline the first month and during the next month the previous findings are monitored. PLNG's Environmental and Social team classifies the reports and PLNG Operations determines the estimated time frame for a response. After monitoring the findings they develop a scope of work. All findings are reported in a database and the data is updated monthly. ProNaturaleza's technical team reviews PLNG responses, and the monitors are responsible for following up on the responses. Thus the action items are recorded as "closed" by the monitors, not the company.

It is also important to implement a user-friendly reporting system to ensure that monitors and communities can see how findings are used. Although the database functioned well, PLNG realized that it was difficult to analyze the data and it was not user-friendly for stakeholders. The original findings map developed early on was difficult to operate because of the configuration of the software and setup of the database. PLNG, ProNaturaleza, and a team of monitors are designing a new webpage to summarize the results in a user-friendly fashion that can be easily presented to the public. Once the final draft webpage is ready it will be first disclosed to affected communities for validation, then disclosed to the general public.

Lesson 20: Encourage monitors to build their skills and become community leaders

"I'm seen as a leader and invited to give talks at local schools on environmental topics like waste management."

– Edgar Janampa, Monitor from Ayacucho (from 2009 to 2012)

Monitors develop a unique skill set within their communities through repeated training, providing them with increased visibility and employment opportunities. They become particularly skilled at communication and public speaking. Among the monitors taking part in the PLNG participatory monitoring program, 70% were men and 30% were women. Over the course of the program, a number of local monitors have become community leaders. Among the leaders, many are young (70%) and a growing number are women (35%). The monitoring program has contributed to participants' personal growth and reputations within their communities; this was a positive but unplanned aspect of the program.

Many monitors now hold elected positions on community boards or in local governments. For example, one local monitor was elected governor of Pilpichaca in February 2012. In another community a monitor serves as a judge. Monitors are respected by local communities and learn transferable and desirable skills.

Problems may occur when the monitor's perception differs from that of his/her community. One example of such a situation occurred in Ayacucho during the construction phase. The company put up an antenna, and the community president was convinced the antenna was there to stop the rain so that construction could continue during the rainy season. Although it was difficult to contradict his community's leader, the monitor responsible for this area explained that this perception was false and the president eventually accepted the monitor's explanation. This example highlights the importance of investing time in the monitors' communication skills so that they can transmit information and use strong evidence to inform their communities, rather than being viewed as a mouthpiece of the company.

Lesson 21: Neutrality of monitors is critical

In some cases, communities may misunderstand the role of a monitor. For instance, some communities falsely believe monitors can negotiate for land compensation. The role of the monitor is to inform the community and the company, to monitor company responses to community concerns, and to remain neutral throughout. It is important that the company's community relations team, the technical team from the local counterpart (ProNaturaleza), and the local monitors emphasize the neutral role of monitors.

One issue may be payment of monitors. "The perception is normally that you are loyal to the one who pays you," says Martin Alcalde, director of ProNaturaleza, who adds that it takes some convincing for the community to accept that the monitor has a neutral role. It is important to clarify from the beginning that this is not the case. It may also be worth considering alternatives to direct cash payments, but this must be balanced against offering participants the equivalent of potential missed wages.

Participatory monitoring is becoming accepted practice in complex projects where stakeholder involvement can minimize risk and increase positive outcomes. Through monitoring, a company actively involves stakeholders in the oversight of company performance, allowing for negotiated partnerships and shared decision-making. PLNG's monitoring program continued even after the completion of construction and has played a strong role in building local capacities and building trust between the company and communities. This shared experience contributes to improved relationships and helps reduce social tensions and manage expectations and challenges.

> "They think I represent the company, and the community has asked me to negotiate for them. They also think I'm making a lot of money, even though I'm only working eight days."
>
> - Dionisio de la Cruz, a local monitor from Acocro district in Ayacucho

V. Summary of Lessons

Lesson 16

- Make the business case for participatory monitoring to achieve buy-in from company leadership

  The value proposition for businesses includes (i) early detection of project risks, (ii) pollution related issues, and (iii) stakeholder engagement to head off conflict. A participatory monitoring program allows companies to build a communication channel with communities and to build a positive brand image.

Lesson 17

- Community feedback can continuously improve participatory monitoring program design and action plans

  The data and the design of the participatory monitoring program should be continuously tested and improved. It is also important for monitoring observations to become integrated in all relevant company programs.

Lesson 18

- It is critical to work with a reliable and experienced implementing partner with country experience

  An experienced partner can build strong relationships between their technical team and local monitors. They can also promote information sharing for quality assurance purposes.

Lesson 19

- Monitors should validate company responses

  Build trust with communities by ensuring that monitors report findings and also close out each action after determining whether or not the company has sufficiently responded to their reports.

Lesson 20

- Encourage monitors to build their skills and become community leaders

  Monitors are able to develop skills that allow them to take on leadership roles in community government. It is important to invest time in the monitors' communication skills in particular so that they can clearly transmit information about the project and report on company responses to community concerns.

Lesson 21

- Neutrality of monitors is critical

  It is essential that the company's community relations team, the technical team from the local counterpart (ProNaturaleza), and the local monitors emphasize the neutral role of monitors. Projects may want to consider alternatives to cash payments where possible, while ensuring that participants do not lose out on missed salary.

VI. Conclusion

As demonstrated in this *Lessons of Experience*, extractive industry companies, particularly those operating in areas of high biodiversity value or in close proximity to communities, face a number of significant environmental and social risks. What is even more challenging is that the environmental and social risks that companies face emerge and evolve over time. A robust management system, as outlined in Performance Standard 1, is critical for an organization to address and manage those risks to achieve good environmental, social, and health and safety performance—not just at project conception but over the life of the project and the institution.

There are three key overarching themes that contribute PLNG's ability to address and manage risks related to driver safety, local hiring, biodiversity conservation, and participatory monitoring.

It is critical to conduct site-specific analysis and engage with affected communities to create an ESMS that is tailored to the regional and sectoral context. Off-the-shelf, one-size-fits-all programs do little more than "tick the box."

PLNG demonstrated a sound understanding of environmental and social risks that were specific to the context of the project by engaging effectively with communities. As a result the company designed risk mitigation solutions that were effective and innovative, including a unique driver safety program; a transparent, inclusive, and culturally appropriate plan for hiring local workers; and use of carefully tailored methodologies for conducting survey of the terrain and monitoring biodiversity mitigation efforts.

A robust participatory monitoring program that includes members from affected communities is essential to improving the company's environmental and social performance.

The participation of communities in the monitoring plan enabled early detection of environmental and social risks, the prevention of conflicts among the communities, and opened a channel for communications that was beneficial for addressing issues and solving problems. Additionally, the involvement of community members in the design of the monitoring program and their role in keeping tabs on environmental and social risks during the project helped build trust between the affected communities and PLNG. PLNG's approach in making sure that community feedback translated into corrective action helped to maintain the credibility of monitors and of PLNG.

For an environment and social management system to be effective, the system must adjust to new and evolving circumstances throughout the life cycle, particularly in response to monitoring.

From early days, PLNG demonstrated a commitment to implement an ESMS flexible and robust enough to allow for continuous improvement. This methodology required regular and close stakeholder engagement to learn from their feedback. Stakeholder engagement ranged from traffic safety awareness meetings for communities to engaging communities in local hiring procedures, to relying on community feedback to improve the design of the participatory

monitoring program. In each instance, the project showed its commitment to the cycle of investigation and feedback, taking such feedback seriously and taking corrective action where necessary.

Taken together, the lessons of experience from the PLNG project provide helpful information for other projects of similar nature and scale in terms of mitigating environmental and social risks as well as implementing IFC's Performance Standards.

Good environmental and social risk management is not just about putting any ESMS in place. It's about having the commitment to put in place a system that is tailored to the sectoral and regional context. And it's about allocating resources to maintain a system that is flexible and robust enough to incorporate changes over time in a meaningful way.

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Tel. 1-202-473-1000
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