
Public Environmental Expenditure Review in Peru 2008–2013

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Acronyms

ANA		Autoridad Nacional del Agua (National Water Authority)
DGPNIGA		Dirección General de Políticas, Normas e Instrumentos de Gestión Ambiental (General Directorate of Environmental Management Policies, Standards, and Instruments)
DGPP		Dirección General de Presupuesto Público (General Directorate of Public Budget)
EIS		Environmental Impact Statement
DICAPI		Dirección General de Capitanías y Guardacostas (General Directorate of Captaincies and Coast Guard)
EEZ		economic-ecological zoning
EQS		environmental quality standard
EIA		Environmental Impact Assessment
EIAd		Detailed Environmental Impact Assessment
EIASd		Semi-detailed Environmental Impact Assessment
FOB		free on board
FONCOMUN		Fondo de Compensación Municipal (Municipal Compensation Fund)
IIAP		Instituto de Investigación de la Amazonía Peruana (The Peruvian Amazon Research Institute)
IMARPE		Instituto del Mar de Perú (Sea Institute of Peru)
INEI		Instituto Nacional de Estadística e Informática (National Institute of Statistics and Informatics)
INRENA		Instituto de los Recursos Naturales (Institute of Natural Resources)
LAC		Latin American and Caribbean
MPL		maximum permissible limits
MEF		Ministerio de Economía y Finanzas (Ministry of Economy and Finance)
MINAGRI		Ministerio de Agricultura y Riego (Ministry of Agriculture and Irrigation)
MINAM		Ministerio del Ambiente (Ministry of the Environment)
MINCETUR		Ministerio de Comercio Exterior y Turismo (Ministry of Foreign Trade and Tourism)
MINERGMIN		Ministerio de Energía y Minas (Ministry of Energy and Mining)
MINSA		Ministerio de Salud (Ministry of Health)
MTC		Ministerio de Transportes y Comunicaciones (Ministry of Transportation and Communication)
MVCYS		Ministerio de la Vivienda, Construcción y Saneamiento (Ministry of Housing, Construction and Sanitation)
NPA		natural protected area
OSINERGMIN		Organismo Supervisor de la Inversión en Energía y Minería (Supervisory Agency for Investment in Energy and Mining)
OSINFOR		Organismo Supervisor de los Recursos Forestales y Fauna Silvestre (Agency for the Supervision of Forest and Wildlife Resources)
PEER		public environmental expenditure review
PIGARS		Planes Integrales de Gestión Ambiental de Residuos Sólidos (Comprehensive Solid Waste Environmental Management Plans)
PLANAA		Plan Nacional de Acción Ambiental (National Environmental Action Plan)
PNA		Política Nacional Ambiental (National Environmental Policy)
UNDP		United Nations Development Programme
PRODUCE		Ministerio de la Producción (Ministry of Production)
PROFONANPE		Fondo de Promoción de las Áreas Protegidas del Estado (National Fund for Natural Protected Areas)
SENACE		Servicio Nacional de Certificación Ambiental para las Inversiones Sostenibles (National Service of Environmental Certification for Sustainable Investments)

SENAMHI | Servicio Nacional de Meteorología e Hidrología (National Meteorological and Hydrological Service)

SERNANP | El Servicio Nacional de Áreas Naturales Protegidas por el Estado (National Service of Natural Areas Protected by the State)

SIGERSOL | Sistema de Información para la Gestión de Residuos Sólidos (Information System for Solid Waste Management)

SINANPE | Sistema Nacional de Áreas Protegidas por el Estado (National System of Areas Protected by the State)

SINIA | Sistema Nacional de Información Ambiental (National Environmental Information System)

SNIP | Sistema Nacional de Inversión Pública (National Public Investment System)

SP | service provider

SUNASS | Superintendencia Nacional de Servicios de Saneamiento (National Superintendence of Sanitation Services)

TPE | total public expenditure

TPEE | total public environmental expenditure

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Public Environmental Expenditure Review in Peru 2008-2013

/0/ Executive Summary



EXECUTIVE SUMMARY

Between 2005 and 2013, Peru experienced above-average economic growth compared to other countries in Latin America and the Caribbean. This process of development has led to widespread pressure on the environment. To make economic growth compatible with preservation of the environment and sustainable use of natural resources, Peru has taken steps to strengthen its environmental institutions.

This public environmental expenditure review (PEER) document provides an in-depth analysis of Peru's environmental expenditures between 2008 and 2013 within all public institutions at the national, regional, and municipal levels with a record of expenditures whose main purpose is public environmental management. For the purpose of this publication, the definition of public environmental expenditure is "any expenditure by public institutions in activities aimed directly at the prevention, reduction, and elimination of pollution or any other degradation of the environment caused by human activity, as well as for activities related to natural resource management that are not carried out for the exploitation of resources or production." The objective herein is to provide a sound analysis that will allow decision makers to identify opportunities for enhancing public expenditure efficiency and effectiveness. To that end, there are three proposed lines of analysis. The first is quantification of public expenditure and the identification of the main institutions that execute it. The second is an analysis of the coherence between the expenditure and the government's strategic objectives. The third is a review of expenditure effectiveness in terms of the main results obtained.

EVOLUTION OF PUBLIC EXPENDITURE

Between 2008 and 2013, public environmental expenditure increased from US\$510.7 million to US\$1.295 billion, indicating an increase in public efforts toward public environmental management.^{1, 2} The increase in expenditure

¹ All of the values expressed in dollars in this document are calculated according to the 2012 internationally comparable value, unless otherwise indicated.

² Previous studies have measured public environmental expenditures using different methodologies and scope. Abugattás (2005) estimated US\$143 million of national and regional government expenditure in 2005, while our study estimates US\$166 million in 2008 for the same government levels. Shack (2006) estimated US\$74.7 million of national government expenditures for 2005, and our study estimates US\$105 million in 2008.

was also observed in relative terms, as it rose from US\$17 to US\$42.5 per capita by the end of the period. Environmental expenditure accounted for 1.9 percent of public expenditure and 0.36 percent of GDP in 2008, reaching 3.1 percent and 0.6 percent, respectively, in 2013. While the expenditure level in relative terms is below that of OECD countries, Peru is ahead of some countries in the Latin American and Caribbean (LAC) region, such as Bolivia, Guatemala, and Paraguay.

Throughout the period of analysis, regional and local governments executed more than 80 percent of the expenditure, which consisted primarily of spending on sewerage networks, solid waste management, and reforestation. The national government has executed 11 percent of the expenditure in activities related to regulation, planning, reporting, monitoring, and enforcement.

An analysis of budget execution capacity reveals disparities among the different levels of government.³ Between 2009 and 2013, the national government executed, on average, more than 85 percent of the budget originally allocated, regional governments reached an average of 79 percent, and local governments lagged behind them at 69 percent.

The national government agencies with the highest expenditures are the following:

- The Ministry of the Environment (Ministerio del Ambiente, or MINAM) (US\$173 million) and Agency for Environmental Assessment and Enforcement (Organismo de Evaluación y Fiscalización Ambiental, or OEFA) (US\$55.6 million), the governing bodies for environmental management
- The National Water Authority (Autoridad Nacional del Agua, or ANA) (US\$161 million), responsible for managing the water resources
- The Ministry of Production (Ministerio de la Producción, or PRODUCE) (US\$42 million), the main fisheries resources management agency
- The Ministry of Agriculture and Irrigation (Ministerio de Agricultura y Riego, or MINAGRI) (US\$96 million), the body that deals with forest resources management
- The National Service of Natural Areas Protected by the State (El Servicio Nacional de Áreas Naturales Protegidas por el Estado, or SERNANP) (US\$71 million), responsible for the protection of biodiversity.

The source of environmental expenditure funds reveals an increase in the ability to generate funds directly (at 20 percent of total expenditures)

³ The capacity to execute the budget is measured as a ratio of the budget executed at the end of the year and the initial modified budget (initial allocation of MEF).

through fees for the use of natural resource and environmental permits. Specific central budget resources⁴ financed 40 percent of the expenditure, while ordinary resources⁵ financed 32 percent. Donations, transfers, and credit operations funded less than 8 percent of the expenditure.

The geographic distribution of expenditure within the country has been uneven. Lima, the country's capital and residence for about half the population, received more than 30 percent of the expenditure during this period. The remaining 70 percent was divided among the nation's 23 departments. Although the greatest portion of the total expenditure was concentrated in Lima, it is still below the national average in relative terms. The expenditure per capita in Lima was US\$27.9, compared to a national average of US\$28.5, and total expenditure accounted for 0.4 percent of the department's gross domestic product (GDP), compared to a national average of 0.7 percent.

Public expenditure has been geared toward three overarching strategic objectives: environmental quality management, natural resource conservation, and environmental governance, aligning with government plans. Environmental quality management received more than 80 percent of the expenditure, as the government made major public investments in waste water management and solid waste management. More than 12 percent of the expenditure was devoted to promoting sustainable use of natural resources. The main activities were related to protected area management, reforestation, and fisheries resources management. Lastly, major efforts were undertaken to strengthen environmental governance, which also contributed to the other two major strategic objectives. Despite constituting less than 8 percent of total expenditure, the major increase in spending on environmental enforcement, monitoring, and enforcement-related activities demonstrates the government's commitment to incorporating environmental management into economic development.

EXPENDITURE QUALITY ANALYSIS

Evaluating the efficiency and effectiveness of public environmental expenditure has certain limitations. The lack of available information on environmental quality and level of compliance with regulations makes it hard to directly attribute the impacts of an increase in public expenditure to improvement in major outcomes of interest. Moreover, the lack of estimates regarding the level of expenditure needed to achieve environmental goals restricts the ability to evaluate the existing funding gaps.⁶

⁴ Specific central budget resources include: fund contributions, municipal compensation fund, special taxes, royalties, customs revenues.

⁵ Ordinary resources are central budget resources obtained through ordinary tax collection and other concepts.

⁶ Any estimate of these gaps will also depend on the distribution of responsibility between the state and the private sector insofar as environmental management is concerned.

A number of changes in environmental outcomes and impacts are worth highlighting. The concentration of particulate matter PM10, sulfur dioxide (SO2) and nitrogen dioxide (NO2) decreased in the main cities of the country between 2008 and 2013 (MINAM, 2014a). This improvement in air quality contributed to the 32 percent reduction in cases of acute respiratory infections in children under 5. While acute diarrheal diseases decreased 30 percent, water pollution continues to be a challenge in the country. Although wastewater treatment increased from 33 to 47 percent, more than 40 percent of the country's river basins fail to meet the quality standards established by the regulation.

Negative trends are observed with respect to natural resource management outcomes. Annual deforestation rates increased from 1 percent in the period 1990–2005 to 2 percent in 2000–2015. More than 810,000 hectares were deforested between 2008 and 2013. The number of critically threatened and endangered fauna species went from 23 and 71 in 2004 to 64 and 122, respectively, in 2014.⁷ Finally, the percentage of fish species stocks biologically collapsed or overexploited went from 34 percent in 2008 to 53 percent in 2013. This section presents an analysis of expenditure effectiveness by subject area and the main results observed during the period.

Environmental Licensing, Monitoring, and Enforcement. One of the priorities during the period of analysis was to strengthen Peru's environmental governance. Expenditures on environmental licensing, monitoring, and enforcement in 2008 amounted to US\$8 million, increasing by 50 percent annually to US\$66 million in 2013. Total expenditure reached US\$147 million during this period and includes the creation and operation of governing institutions like MINAM and OEFA and the activities undertaken by regional and local governments. The activities conducted were of a regulatory and enforcement nature, with a cumulative expenditure that amounted to less than 3 percent of total public expenditure. During this period, 1,818 environmental licenses were granted to mainstream environmental management into the various productive sectors. The recently OEFA increased the number of environmental audits from 1,330 in 2011 to 2,850 in 2013. OEFA also applied 1,486 sanctions, collecting a total of US\$55 million. A large percentage of the sanctions were associated with the mining sector, indicating limited compliance with mandated environmental regulations. The number of environmental crimes (5,077) and socio-environmental conflicts (139) registered also confirm the challenges in mainstreaming environmental management into the country's economic development process.

Water Quality Management. The government of Peru has assigned more than 46 percent of its resources to water quality management—that is,

⁷ It is possible that part of the increase in threatened species is due to a greater number of species being categorized in 2014.

close to US\$2.481 billion in cumulative expenditure during the period. Expenditures in 2008 amounted to US\$147 million, increasing by 50 percent annually to US\$604 million in 2013. A large part of the expenditure was used to construct sewerage networks, which helped expand the network's coverage (from 77 to 84 percent in urban areas). The government also financed the operation and construction of treatment plants. Despite the increase in the percentage of wastewater treated (from 33 to 47 percent), there is still a lag in treatment capacity with respect to collection coverage. Along with these investments, the government created a governing body, the ANA, which introduced permits to discharge waste water as a way to manage water pollution from nondomestic sources. The information available on the status of water quality in the country reveals the existing water pollution challenges. More than 40 percent of river basins exceed pollutant concentrations established by water quality regulations.

Air Quality Management. Expenditure in this area was approximately US\$74 million during this period. This expenditure accounted for just 1.4 percent of the total and focused on regulatory, monitoring, and enforcement-related activities.⁸ A number of cities, such as Lima, have implemented effective policies to reduce the sulfur content in fuel, change the vehicle energy matrix, implement mass transportation systems, and inspect vehicular emissions, among other activities (OECD, 2016). The existing data reveal a decrease in the concentrations of the main pollutants (for example, 23 percent for PM10, 33 percent for SO₂) in Lima. However, there are still numerous periods throughout the year when the air quality exceeds the established environmental quality standards (EQS).

Solid Waste Management. At a cumulative total of US\$1.66 billion (31 percent of the total), this is the second most important category in public environmental expenditure. Expenditures amounted to US\$223 million in 2008, increasing by 11.5 percent annually to reach US\$339 million in 2013. The increased expenditure has led to an expanded coverage of collections services (from 83 percent to 86.7 percent). The country is currently facing a deficit of adequate waste disposal infrastructure. Urban solid waste deposited in landfills increased from 26 to 41 percent of the total waste collected. The rate of recycling increased from 1.8 to 8.9 percent in 2013. Yet, the deficit in revenues from service charges (in 2013, only 47 percent of the cost was recovered in fees) places a burden on the balance sheets of the state-owned enterprises that provide these services.

Biodiversity Protection. The total expenditure reached US\$195 million, that is, 3.7 percent of the total. Expenditures amounted to US\$26 million, increasing by 7.6 percent annually to reach US\$38 million in 2013. More

⁸ The amount and share of expenditure are influenced by the fact that the private sector heavily supports most of expenditures to reduce air emissions.

than half of the expenditure was earmarked for the National System of Areas Protected by the State (Sistema Nacional de Áreas Protegidas por el Estado, or SINANPE), which boosted its coverage during this period (from 15.7 to 17.9 million hectares). The amounts allocated to managing the natural protected areas (NPAs) do not guarantee proper functioning of the system. Several studies estimate a budget deficit in the range of 35 to 51 percent of the existing budget. The revenue collected from visitors increased (from US\$1.3 million to US\$2.3 million), as did the number of visitors (from 600,000 to 1.3 million) during this period. However, the revenue generation does not entirely reflect the total value of the goods and services provided by the NPAs beyond its touristic value. Furthermore, SINANPE has limited coverage of the country's ecoregions, and it is estimated that more than 30 percent of species are not adequately protected by this system.

Forest Resources Management. Total expenditure on forest resources management was US\$265 million. Expenditures amounted to US\$23 million in 2008, increasing by 35 percent annually to reach US\$73 million in 2013. The majority of the expenditure (63 percent) funded reforestation activities. A total of 153,000 hectares were reforested, for an average cost of US\$778 per hectare. The deforestation rates observed, together with the reforestation efforts and the allocation of resources to this category, have all fallen short of the government's original plans. Expenditures on activities related to monitoring, control, and enforcement have been low during the period. Both these activities and reforestation efforts contributed to the protection of biodiversity.

Fisheries Resources Management. The expenditure reached a total of \$164 million. Expenditures amounted to US\$24 million in 2008, increasing by 9.5 percent annually to reach US\$34 million in 2013. The primary activities funded were research, administration, and enforcement of fisheries activities. While total annual landings have been decreasing over time (from 7,362 to 5,948 metric tons), the percentage of overfished or collapsed species stocks has increased (from 34 percent to 53 percent). During the period studied, the government introduced a system of individual quotas to ensure the sustainability of the country's main fishery, the anchovy fishery. Nevertheless, public expenditures as a share of total catch value is only 1 percent, much below the 10 percent average share that OECD countries exhibit. The expenditure gap is more pronounced for activities related to the enforcement of fisheries policy.

POLICY RECOMMENDATIONS

Despite the limitations inherent in evaluating expenditure efficiency and effectiveness, an analysis of expenditure quality makes it possible to establish several policy recommendations, detailed below.

Environmental Management Planning. At the strategic level, environmental management planning and prioritization processes should be strengthened. To establish monitoring indicators, goals and objectives, there should be appropriate information on the status of the environmental quality, the degree of private sector regulatory compliance, the evolution of pressures, and the cost associated with achieving the established goals. Incorporating this information into strategic environmental action plans facilitates prioritization when allocating public resources. This information is also instrumental in establishing robust mechanisms to monitor the effectiveness of public expenditure.

Measuring Public Expenditure. Public budget information systems should be strengthened to record environmental expenditure transactions more precisely. In some cases, expenditures need to separate aggregate categories such as water supply and environmental sanitation to properly account for the portion of expenditure related to environmental activities. In others, the recording of expenditure transactions should more accurately distinguish the nature of the environmental activity being funded.

Institutional Framework. Environmental management responsibilities should be distributed clearly among governmental institutions. Roles should be clarified to a greater extent and be accompanied by technical capacity building. Duplication of roles and loopholes in environmental institution mandates should be eliminated. Particularly important is the need to strengthen the technical capacity of local and regional governments to facilitate coordination with national governing entities, thereby promoting effective environmental management at the local level.

Environmental Information for Regulatory Purposes. Reliable information on the status of the environment, sources of pollution, and the private sector's ability to comply with regulations is critical to design effective environmental regulation. The existing standards, EQS, and MPLs should be revised to increase their effectiveness. Similarly, the system of sanctions should be revised to incorporate a scale of fines based on the severity of the environmental damage and its associated restoration costs.

Environmental Quality Management. The level of expenditure should be increased to guarantee adequate provision of environmental public goods. The coverage and quality of services provided, such as wastewater and solid waste management and protection of biodiversity, are compromised by the existing resource constraints. New investments are needed to increase coverage, and the existing budget cannot properly cover recurrent operational and maintenance costs of services. To ensure the sustainability of existing investments, increased revenue can be generated by revising the fees charged or introducing new payment schemes for services rendered.

Public investment in pollution management should be complemented by activities that help reduce the pollution load in the environment. For domestic pollution sources, increasing sewerage network coverage or solid waste collection should go hand in hand with an increased capacity for wastewater treatment and appropriate final disposal of all waste. In the case of nondomestic pollution sources, management instruments should be strengthened to shift the burden of responsibility for pollution reduction to the private sector. Instruments such as discharge permits should be established for the economic sectors with the greatest environmental impact. These permit systems should be accompanied by monitoring and enforcement activities to ensure environmental compliance.

Protection of Biodiversity. Budgetary restrictions highlight the need to target expenditures on NPAs to achieve the greatest impact in terms of biodiversity protection. Allocating funds to NPAs based on the level of threat to biodiversity or its potential touristic appeal can yield better results. Furthermore, synergies with activities aimed at reducing pressures (e.g., deforestation control) and restoring ecosystems (e.g., reforestation) outside the NPAs, together with private sector and nongovernmental organization involvement, must be exploited to leverage efforts for biodiversity protection.

Forest and Fisheries Resources Management. The promotion of rights-based management policies must be accompanied by complementary investments. Monitoring and enforcement systems must be strengthened to guarantee compliance with policies aimed at controlling the overexploitation of resources. Investments in public goods, such as research, plant health, and fire management, are the basis for guaranteeing the sustainable use of resources in the long term.

/1/ Introduction



1. INTRODUCTION

Peru experienced above-average economic growth compared to other LAC countries between 2005 and 2013. This process of development has led to widespread pressure on the environment. The country has made major efforts to strengthen its environmental institutional framework, with the goal of aligning economic growth with environmental protection and sustainable use of natural resources. In 2005, the General Law of the Environment was passed, and, in subsequent years, new policies and plans were developed and implemented. This regulatory momentum was followed by the creation of new governing institutions for environmental and natural resource management. A larger amount of public funds were also allocated for environmental management.

This public environmental expenditure review (PEER) document evaluates the allocation of public funding in the context of efforts to strengthen institutional capacity for environmental management between 2008 and 2013.⁹ The objective is to provide a sound analysis, based on empirical evidence, that will allow decision makers to identify opportunities to enhance the efficiency and effectiveness of public expenditure earmarked for environmental management. To that end, three strands of analysis were conducted. First, the main institutions responsible for environmental management are identified. Public expenditures executed by those agencies are then quantified. Second, the coherence between expenditure and the government's strategic objectives is analyzed. Lastly, an analysis of the quality of expenditures is conducted by identifying the contribution of expenditures to achieving results.

This document contains various novel aspects with respect to previous public expenditure studies.¹⁰ An exhaustive review of expenditure between 2008 and 2013 was conducted. It covered all public institutions at the national, regional, and municipal levels with any record of environmental expenditures. Expenditures were identified based on international criteria so that they could be compared with those of other countries. Information on the status of environmental quality and natural resources and the main results obtained by the institutions responsible for executing public expenditure was also gathered for the study. The combination of this information

⁹ The period of analysis starts in 2008 for a variety of reasons. A large number of institutions governing environmental issues were created that year (MINAM, OEFA, ANA, SERNANP). In addition, the public budget information systems started recording municipal expenditures transactions in 2008.

¹⁰ Abugattás (2005) and Shack (2006) conducted the first approaches to quantifying public expenditure in Peru with a partial expenditure coverage. Subsequently, MINAM published a study in 2015 that offered a more thorough quantification of the expenditure. However, this study does not provide any information on achievements as far as the country's environmental management goals are concerned.

on the status of the environment, the level of public expenditure, and the main results obtained make it possible to assess the effectiveness of the expenditure and the opportunities to improve its quality.

The document is structured as follows. Chapter 2 contains a review of how the environmental management framework evolved during the period of analysis. It identifies Peru's primary environmental management institutions and the roles assigned to them in accordance with the legal framework. Chapter 3 presents the results of the quantification of public environmental expenditure between 2008 and 2013. It describes the evolution of the expenditure, its volume, the executing institutions, the activities funded, and the various types of environment-related expenditures. Chapter 4 analyzes the quality of public expenditure. First, it provides an assessment of the alignment of public expenditures with the government's strategic objectives. It goes on to offer an in-depth analysis of the results associated with execution of the expenditure and the main challenges to enhancing the level of effectiveness for different areas of environmental management. This chapter covers the following subject areas: licensing, environmental monitoring and enforcement, water resource and waste water management, solid waste management, protection of biodiversity, and forest and fisheries resources management. Chapter 5 provides conclusions policy recommendations.

/2/

The Evolution of the Environmental Management Framework, 2003–2015



2. THE EVOLUTION OF THE ENVIRONMENTAL MANAGEMENT FRAMEWORK, 2003–2015

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Peru experienced above-average economic growth compared to other countries in the LAC region between 2005 and 2013. This process of development led to widespread pressure on the environment. The country made efforts to strengthen its institutional framework, with the goal of aligning economic growth with environmental protection.

Environmental Management

The passage of the General Law on the Environment in 2005 paved the way for the subsequent creation of the Ministry of the Environment (Ministerio del Ambiente, or MINAM) in 2008 as the institution responsible for national environmental management. The creation of MINAM was a milestone for future institutional reforms to the country's environmental management framework. Before 2008, sectoral ministries (transport, mining and energy, agriculture, tourism, industry, and fisheries, among others) had their own environmental management units that issued licenses and monitored compliance with their sector's environmental mitigation plans. MINAM assumed greater responsibilities in both the environmental licensing process of sectoral ministries and the establishment of environmental management policies and instruments, such as quality standards and maximum permissible limits. The environmental licensing process was modified again in 2012, with the creation of the National Service of Environmental Certification for Sustainable Investments (Servicio Nacional de Certificación Ambiental para las Inversiones Sostenibles, or SENACE),¹¹ the body responsible for reviewing the environmental impact studies of the country's largest investment projects.

MINAM coordinates with several institutions to undertake the responsibility for environmental monitoring. The National Meteorological and Hydrological Service (Servicio Nacional de Meteorología e Hidrología, or SENAMHI) is the main agency with monitoring networks for the atmosphere and water. The Ministry of Health (Ministerio de Salud, or MINSA) has a network and laboratories to monitor environmental public health. In some cases, regional and local governments have environmental quality measurement stations, such as in Lima.

¹¹ SENACE was not in operation at the time of the study; therefore, no expenditures from this institution have been included.

The same year that MINAM was created, the Agency for Environmental Monitoring and Enforcement (Organismo de Evaluación y Fiscalización Ambiental, or OEFA) was established as the body responsible for monitoring compliance with environmental regulations and imposing sanctions in the event of a violation.¹² As an agency under the central government, OEFA also depends on decentralized environmental enforcement institutions and regional and local governments.

The institutional framework for managing public environmental health is composed of both local governments and national government institutions. Local governments are primarily responsible for providing public services for solid waste management and sanitation. At the national level, the Ministry of Housing, Construction and Sanitation (Ministerio de la Vivienda, Construcción y Saneamiento, or MVCYS) is the body responsible for regulating these services, and the National Superintendence of Sanitation Services (Superintendencia Nacional de Servicios de Saneamiento, or SUNASS) enforces regulatory compliance in conjunction with MINSA, which monitors compliance with public health regulations.

Natural Resource Management

Renewable and nonrenewable natural resources are an important foundation for the country's development and wellbeing. The institutional framework was established to manage resources that contribute significantly to income and employment generation, namely, resources from mining, hydrocarbon, and fisheries activities.

The Ministry of Energy and Mining (Ministerio de Energía y Minas, or MINERGMIN) regulates the use of the country's mining and energy resources. The Supervisory Agency for Investment in Energy and Mining (Organismo Supervisor de la Inversión en Energía y Minería, or OSINERGMIN) conducts supervision and enforcement of regulations. Although historically MINERGMIN was responsible for managing the environmental impacts of resource exploitation, the regulatory changes that took place during the period of analysis led to greater participation by MINAM and OEFA in these tasks.

The Ministry of Production (Ministerio de la Producción, or PRODUCE) is responsible for fisheries exploitation policies and carries out enforcement activities together with the General Directorate of Captaincies and the Coast Guard (Dirección General de Capitanías y Guardacostas, or DICAPI). The Sea Institute of Peru (Instituto del Mar de Perú, or IMARPE) is the agency responsible for monitoring the state of resources and provides scientific reports that are used as the basis of regulations promoted by PRODUCE.

¹² In 2009, the Law on the National System of Environmental Assessment and Enforcement (Law N.º 29325) was passed to regulate the operation of regulatory institutions and instruments.

In the case of water and forest resources and biodiversity, which indirectly contribute to the economy or do so to a lesser extent, the institutional framework underwent significant changes during the period of analysis, aimed at promoting the conservation and sustainable development of such assets. Originally, these resources were managed by the National Institute of Natural Resources (Instituto de los Recursos Naturales, or INRENA). During the period of analysis, institutional reforms dismantled INRENA and transferred its responsibilities to other national government agencies. During the period of analysis, local and regional governments participated significantly more in the management of these resources through investment projects and enforcement activities.

The management of water resources was transferred to the National Water Agency (Autoridad Nacional del Agua, or ANA), created in 2008. ANA is also responsible for enforcement activities in conjunction with OEFA and other institutions, such as SUNASS and MINSA. The management of forest resources fell under the Ministry of Agriculture and Irrigation (Ministerio de Agricultura y Riego, or MINAGRI), and in 2008 the Agency for the Supervision of Forest and Wildlife Resources (Organismo Supervisor de los Recursos Forestales y Fauna Silvestre, or OSINFOR) was created to enforce regulations on forest and wildlife conservation.¹³ In addition to OSINFOR, the National Service of Natural Areas Protected by the State (El Servicio Nacional de Áreas Naturales Protegidas por el Estado, or SERNANP) was also created in 2008. SERNANP is the governing body of the national system of protected areas, whose objective is the protection of the country's biodiversity.

Major Government Plans

Two distinctive planning instruments stood out during the period of analysis, each of which contained strategies to guide the national, regional, and local governments, as well as the private sector and civil society, on environmental matters: The National Environmental Policy (Política Nacional Ambiental, or PNA), approved in 2009, and the National Environmental Action Plan 2011–2021 (Plan Nacional de Acción Ambiental, or PLANAA), approved in 2011.

The PNA is based on the principles contained in the General Law on the Environment and establishes pillars with objectives and guidelines. These pillars include the conservation and sustainable exploitation of natural resources and biological biodiversity, the integrated management of environmental quality with a special emphasis on public health, and the improvement of environmental governance processes.

¹³ In 2011, the Forest and Wildlife Law was passed. It enacted changes in the institutional framework for forest resources management. These changes were not yet implemented during the period of analysis.

The PLANAA defines and develops the national environmental policy for the 2011–2021 period (MINAM, 2011). The objectives are to improve quality of life, guarantee the existence of healthy and functional ecosystems in the long term, and promote sustainable development in Peru. The plan establishes a series of actions structured around seven high-priority areas: water, solid waste, air, forests and climate change, biodiversity, mining and energy, and environmental governance. Table 1 outlines the main agencies related to environmental and natural resource management.

TABLE 1

MAIN AGENCIES WITH FUNCTIONS RELATED TO ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT

INSTITUTION	ACRONYMS	MAIN FUNCTIONS
Ministry of the Environment	MINAM	Governing body of environmental management. Responsible for developing environmental policies (quality standards and maximum permissible limits). Coordinates environmental management with the other institutions. Controls the environmental licensing process jointly with the sectoral institutions.
Agency for Environmental Monitoring and Enforcement	OEFA	Governing body of the environmental monitoring and enforcement system. Monitors compliance with environmental regulations. Enforces and imposes sanctions in the event of a violation.
National Meteorological and Hydrological Service	SENAMHI	Main body for meteorological, hydrological and environmental monitoring in the country.
National Service of Natural Areas Protected by the State	SERNANP	Governing body of the National System of Public Protected Areas.
The Peruvian Amazon Research Institute	IIAP	Scientific research for the evaluation and inventory of the natural resources of the Amazon.
Ministry of Agriculture and Irrigation	MINAGRI	Promotes the environmental management of the impacts of agricultural activity. Governing body for the management of the country's forest resources. It is responsible for administration, control and monitoring.
Agency for the Supervision of Forest and Wildlife Resources	OSINFOR	Governing body responsible for monitoring and enforcing the exploitation and conservation of forest and wildlife resources, as well as environmental services from the forest.
National Water Authority	ANA	Governing body for the management of water resources. It is responsible for administration, control and monitoring.
Ministry of Energy and Mining	MINERGMIN	Governing body for the management of the country's mining and energy resources. Promotes environmental management of the impacts of mining and energy activities.
Supervisory Agency for Investment in Energy and Mining	OSINERGMIN	Governing body responsible for monitoring and enforcing regulatory compliance of companies in the electrical, hydrocarbon, and mining sectors.
Ministry of Production	PRODUCE	Governing body for the management of the country's fisheries resources. It is responsible for administration, control and monitoring. Promotes environmental management of the impacts of industrial and fisheries activities.
Sea Institute of Peru	IMARPE	Research and monitoring of fisheries resources, providing the scientific basis for the fisheries management policies issued by PRODUCE.

(continued on next page)

TABLE 1 (continued)

MAIN AGENCIES WITH FUNCTIONS RELATED TO ENVIRONMENTAL AND NATURAL RESOURCE MANAGEMENT

INSTITUTION	ACRONYMS	MAIN FUNCTIONS
Ministry of Health	MINSA	Evaluates environmental risks and monitors compliance with environmental health standards for air, water, and soil. Regulates and monitors the sanitary quality of potable water and sanitation systems, as well as solid waste management.
Ministry of Housing, Construction and Sanitation	MVCYS	Governing body of the services for sanitation infrastructure (sewerage system) and regulator of solid waste management.
National Superintendence of Sanitation Services	SUNASS	Governing body that oversees and monitors regulatory compliance in the provision of public sanitation services.
Ministry of Transportation and Communication	MTYC	Promotes the environmental management of the impacts of the transportation sector.
Ministry of Foreign Trade and Tourism	MINCETUR	Promotes the environmental management of the impacts of the tourism sector.
Regional governments	GOREs	Implement diverse actions for the management of environmental quality and natural resources (water, biodiversity, forest, among others), including the enforcement of regulatory compliance.
Local governments	GL	Invest in local environmental management services (sanitation, waste collection and disposal), monitor the emission of pollutants in the atmosphere and bodies of water, and manage reserves and local protected natural areas.

/3/ Public Environmental Expenditure Review



3. PUBLIC ENVIRONMENTAL EXPENDITURE REVIEW

3.1 STRUCTURE OF THE PUBLIC BUDGETS IN PERU AND ANALYTICAL APPROACH

Peru's Ministry of Economy and Finance (Ministerio de Economía y Finanzas, or MEF) follows international practices in formulating and reporting on public expenditure. Within the MEF, the National Public Budget Office (Dirección Nacional de Presupuesto Público, or DNPP) is the body governing the National Budget System of Peru. Budgetary data are recorded in accordance with the structure and designations established by the revenue and expenditure classifications. The main classifications used in the Peruvian budgetary system are reviewed below.

The revenue and financing classification specifies the components of current and capital revenue, financing, and existing balance. The institutional classification specifies the institutional units that receive budgetary allocations to carry out activities. The economic classification identifies current expenditure, capital expenditure, and debt service, whereas the geographic classification establishes the territorial area where the expenditure shall be executed. Lastly, the programmatic-functional classification makes it possible to structure, classify, and order expenditures according to the purpose of the activity being financed.

National, regional, and local budgetary data from each year was requested from the MEF, specifically the General Directorate of Public Budget (Dirección General de Presupuesto Público, or DGPP) and the National Accounting Office. The period of analysis was between 2008 to 2013 and includes the opening institutional budget, the modified institutional budget, and the executed budget.

The functional expenditure classification was used to identify the purpose of expenditure that met the definition of public environmental expenditure set forth in the methodological analysis guide prepared by Corderi, Markandya, and Dale (2017). This guide considers a public environmental expenditure to be "any expenditure by public institutions for significant activities aimed directly at the prevention, reduction and elimination of pollution or any other environmental degradation caused by human activity, as well as

for activities related to natural resource management that are not carried out for the exploitation of resources or for production.”

A review at the level of the final objective was conducted to identify environmental expenditure, assessing all line items aimed at the environmental management activities based on the methodological guide mentioned above. A subsequent review of the activity and/or project, subprogram, and program levels was carried out, which made it possible to reach an initial quantitative approximation of public expenditure on environmental matters. When an activity could not be classified, it fell under other environmental protection activities and was presented merely for illustrative purposes,¹⁴ as its reclassification required the direct cooperation of the executing entities given that budget data did not sufficiently indicate the environmental category or scope to which it belonged.

¹⁴ This classification reached US\$211 million during the period—that is, approximately 4 percent of the total environmental expenditure.

3.2 MAIN TRENDS IN PUBLIC ENVIRONMENTAL EXPENDITURE IN PERU

Growth in Total Public Environmental Expenditure

Total public environmental expenditure (TPEE) in real terms grew from US\$510.7 million in 2008 to US\$1.2945 billion in 2013 (Table 2),¹⁵ an increase of more than 2.5 times over the period, at an aggregate annual rate of 20.4 percent. Per capita TPEE rose from US\$17.7 in 2008 to US\$42.5 in 2013. TPEE grew at an annual rate of 20.4 percent, whereas total public expenditure (TPE) and GDP rose around 10 percent and 9 percent, respectively.

As a result of this sustained and accelerated growth, the share of TPEE and GDP visibly increased (Figure 1). In 2008, TPEE was 1.9 percent, growing to 3.1 percent in 2013. TPEE rose from 0.36 percent of GDP at the beginning of the period to 0.6 percent of GDP in 2013 (Figure 2), reflecting increased budgetary allocations to environmental issues.

TABLE 2

TOTAL PUBLIC ENVIRONMENTAL EXPENDITURE: TRAJECTORY AND BASIC INDICATORS

YEARS	2008	2009	2010	2011	2012	2013
REAL (US\$ 2012)						
TPEE US\$ m	510.7	565.3	851.8	997.2	1,094.5	1,294.5
Population (in millions)	28.8	29.1	29.4	29.7	30.1	30.4
INDICATORS						
TPEE/TPE	1.9%	2.0%	2.6%	2.9%	2.8%	3.1%
TPEE/GDP	0.36%	0.41%	0.52%	0.54%	0.54%	0.60%
TPEE pc	17.7	19.4	28.9	33.5	36.3	42.5
TPEE growth	—	10.7%	50.7%	17.1%	9.8%	18.3%

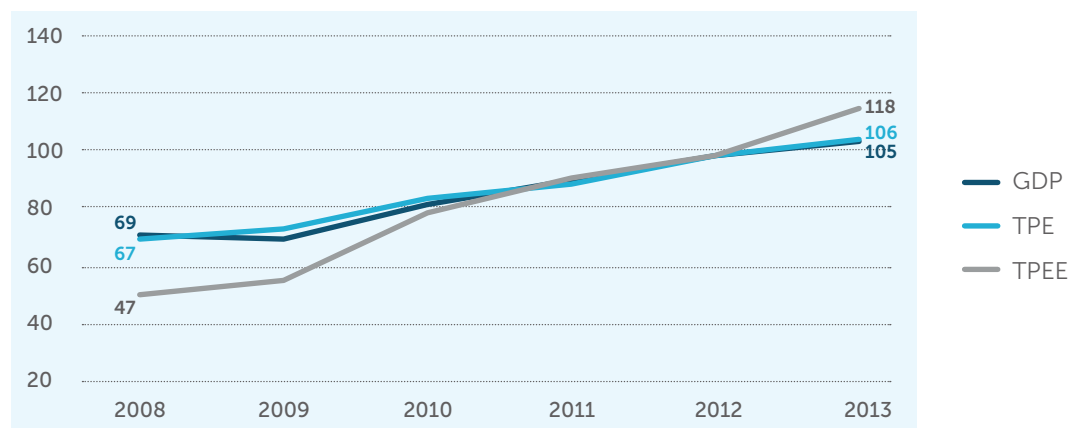
Source: IDB (2014).

TPEE: total public environmental expenditure; TPE: total public expenditure.

¹⁵ Previous studies measured public environmental expenditures using different methodologies and scope. Abugattás (2005) estimated US\$143 million of national and regional government expenditure in 2005 while our study estimates US\$166 million in 2008 for the same government levels. Shack (2006) estimated US\$74.7 million of national government expenditures for 2005 and our study estimates US\$105 million in 2008.

FIGURE 1

EVOLUTION OF ENVIRONMENTAL EXPENDITURES AND MACROECONOMIC CONDITIONS, 2008–2013 (2012 = 100)



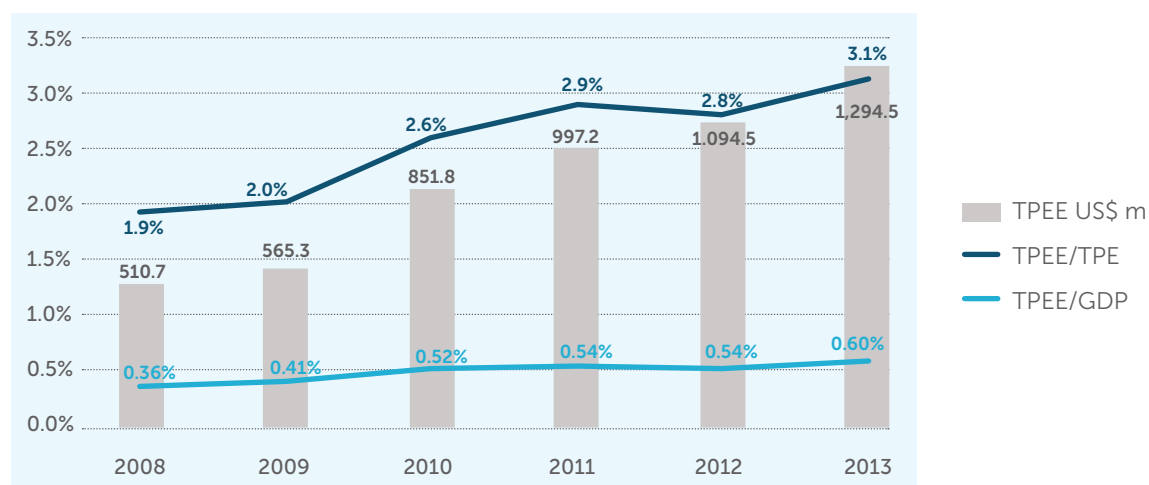
Source: Authors' elaboration based on IDB (2014).

At the regional level, environmental spending levels in Peru can be compared to other countries in the LAC region where data have been compiled following the same methodological approach. Table 3 shows the estimated environmental expenditure for Dominican Republic, Guatemala, Paraguay, and Peru in 2010 and for Bolivia in 2012.

In 2010, TPEE represented 0.52 percent GDP in Peru, placing the country at an intermediate position. Peru was in third place in terms of share of expenditures with respect to national public expenditure, reaching 2.6

FIGURE 2

ENVIRONMENTAL EXPENDITURE TRENDS, 2008–2013 (IN US\$ 2012 MILLIONS)



Source: Authors' elaboration based on IDB (2014).

percent. The country was in second place for per capita expenditure, at US\$25. Starting off with a significantly lower initial level in 2008 (US\$17), Peru's position has improved with respect to neighboring LAC countries, having taken advantage of the economic growth experienced over the last few years. However, there is still a gap in Peru's budgetary allocations to environment spending compared to other LAC countries.

TABLE 3

ENVIRONMENTAL EXPENDITURE IN SELECTED LAC COUNTRIES, 2010

	PER CAPITA (CURRENT PRICES, US\$)	PERCENT OF PUBLIC EXPENDITURE	PERCENT OF GDP
Peru	25.00	2.60%	0.52%
Guatemala	14.50	3.30%	0.50%
Paraguay	3.77	0.38%	0.12%
Dominican Republic	35.09	3.89%	0.65%
Bolivia	21.94	1.08%	0.87%

Source: Authors' elaboration based on Inter-American Development Bank (IDB) data from Bolivia, Dominican Republic, Guatemala, Paraguay, and Peru.

Note: Data for Bolivia are for 2012.

3.3 TOTAL PUBLIC ENVIRONMENTAL EXPENDITURE BY GOVERNMENT LEVEL

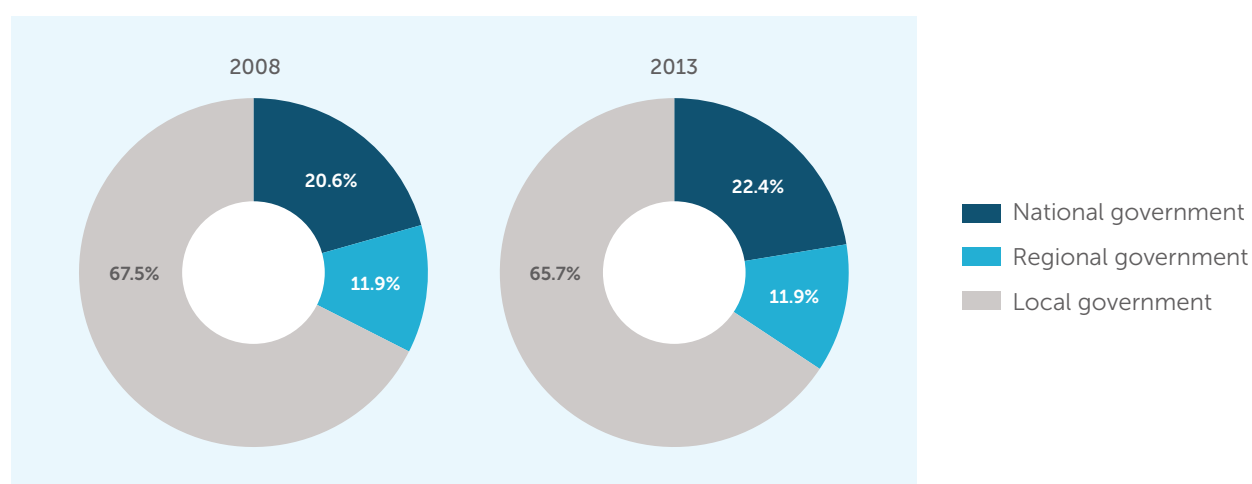
Agencies at three levels execute public expenditure: the national government, which includes spending by the ministries, entities attached to them, specialized institutes, and universities; regional governments; and local governments. Finally, state-owned enterprises also execute TPEE.

The decentralization reforms in the country led to devolution of responsibilities and public funds to the local level (Figure 3). Local governments allocate a major share of expenditures for environmental activities:

- In 2008, local governments executed 67.5 percent of the funds, followed by the national government at 20.6 percent, and regional governments, which spent the least, at 11.9 percent of the total.
- The situation in 2013 shows that at 65.7 percent, local governments continue to lead in the execution of environmental expenditure. The national government executed 22.4 percent of the expenditure, and regional governments 11.9 percent.

FIGURE 3

DISTRIBUTION OF ENVIRONMENTAL EXPENDITURE BY LEVEL OF GOVERNMENT, 2008 AND 2013



Source: Authors' elaboration based on IDB (2014).

The trends in expenditure execution by government level are shown in Figure 4. Local government expenditures rose from US\$344.9 million in 2008 to US\$850.4 in 2013. National government spending increased from US\$105.7 to US\$290.1 million during this period, while regional government spending rose from US\$60.6 million to US\$154 million.

In summary, during the 2008–2013 period:

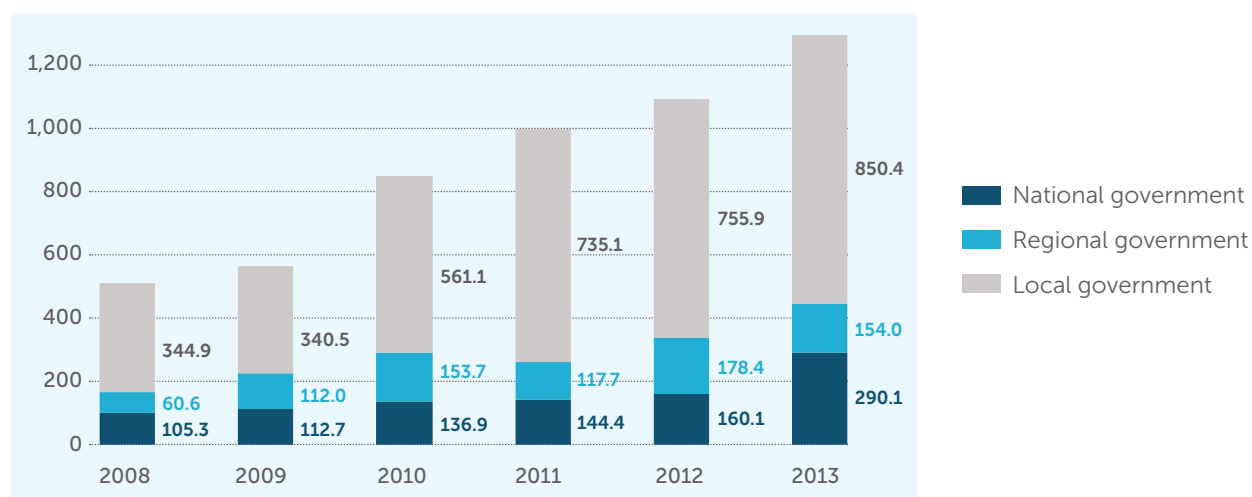
- General government expenditure totaled US\$5.3139 billion, with average annual spending of US\$8.8256 billion, of which:
 - the national government executed US\$949.5 million (18 percent), at an average annual rate of US\$158.2 million;
 - regional governments executed US\$776.5 million (15 percent), with an annual average of US\$129.4 million; and
 - local governments executed US\$3.588 billion (68 percent), with an annual average of US\$598 million.

Local governments continue to play an important role, although it has grown proportionally at a slower rate than at other levels. During the 2008–2013 period, environmental spending by local governments grew at an aggregate annual rate of 20 percent, compared to the 21 percent and 22 percent increase by the regional and central governments, respectively.

An analysis of budget execution capacity reveals disparities between the different levels of government.¹⁶ Between 2009 and 2013, the national government executed, on average, more than 85 percent of the budget originally allocated, regional governments reached an average of 79 percent, and local governments lagged behind at 69 percent.

FIGURE 4

EVOLUTION OF ENVIRONMENTAL EXPENDITURE BY LEVEL OF GOVERNMENT
(IN US\$ 2012 MILLIONS)



Source: Authors' elaboration based on IDB (2014).

¹⁶ The capacity to execute the budget is measured as a ratio of the budget executed at the end of the year and the initial modified budget (initial allocation of MEF).

3.4 PUBLIC EXPENDITURE BY TYPE OF ENVIRONMENTAL MANAGEMENT ACTIVITY

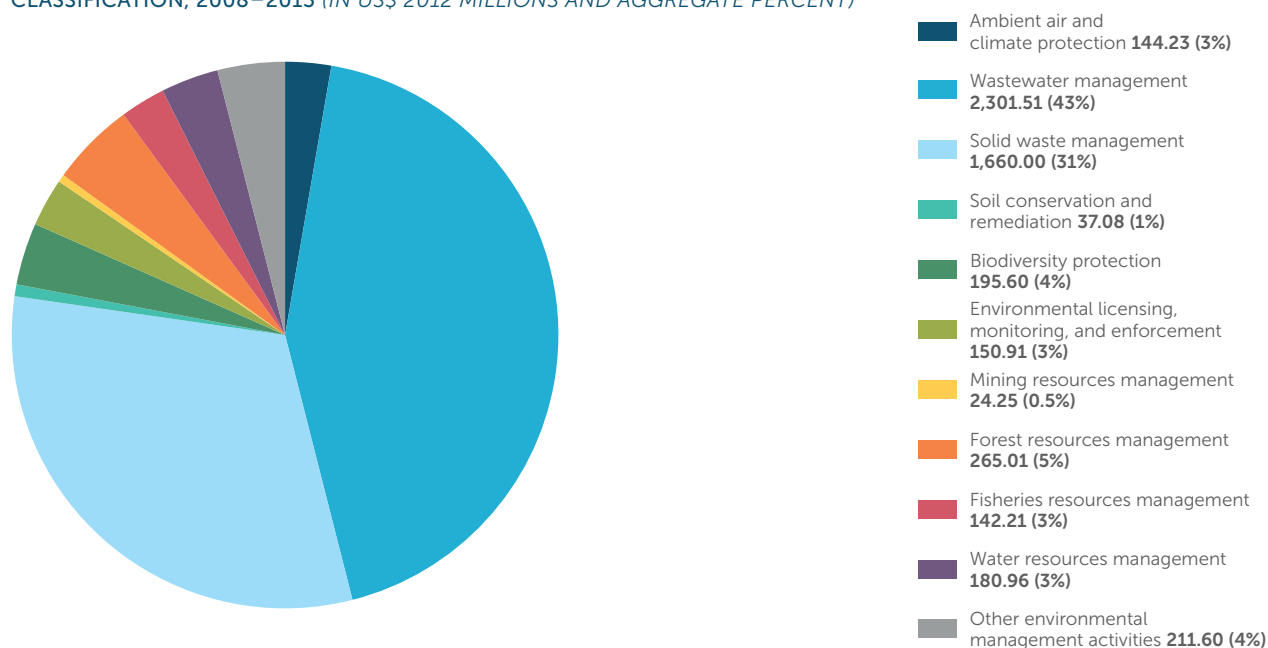
Great disparities exist in budgetary allocations by type of environmental management activity. Wastewater management was the category with the greatest level of disbursements, amounting to 43 percent of total spending. Solid waste management was second in allocation, representing 31 percent of the total. Expenditure for natural resource management and biodiversity protection made up 15 percent of the total. The main allocations were for forest resources, biodiversity protection, water resources, and fisheries resources, with 5 percent, 4 percent, 3 percent, and 3 percent, respectively, of total expenditure (Figure 5).

The expenditure for environmental licensing, monitoring, and enforcement represented 3 percent of the total. Lastly, air and climate protection, soil conservation, and other environmental management activities accounted for 3 percent, 1 percent, and 4 percent, respectively.

The analysis of expenditure trends during the period reveals greater annual growth in expenditure levels for wastewater management, solid waste

FIGURE 5

DISTRIBUTION OF PUBLIC ENVIRONMENTAL EXPENDITURE BY ACTIVITY CLASSIFICATION, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014).

management, water resources management, and environmental licensing and monitoring (Table 4). Despite the general increase in disbursements in absolute terms, a higher rate of investment in specific activities led to a relative change in the share of resources allocated among the different environmental activities financed by the government. For example:

- Solid waste management went from 44 percent participation in 2008 to 26 percent in 2013.
- Spending on environmental activities related to biodiversity protection decreased from 5 percent in 2008 to 3 percent in 2013.
- Fisheries resources management went from 5 to 2 percent in the same period.

By contrast, other line items saw substantial growth during the 2008–2013 period:

- Wastewater management grew from 29 percent in 2008 to 43 percent in 2013.¹⁷
- Environmental licensing, monitoring, and enforcement activities grew from 2 percent in 2008 to 5 percent in 2013.
- Water resources management increased from 0.3 percent in 2008 to 4 percent in 2013.

TABLE 4

TRENDS IN ENVIRONMENTAL EXPENDITURE BY ACTIVITY (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)

	2008	% of TPEE	2010	% of TPEE	2013	% of TPEE	2008–2013 VARIATION
Ambient air and climate protection	23.02	5%	17.93	2%	64.51	5%	19%
Wastewater management	146.44	29%	391.00	46%	550.69	43%	25%
Solid waste management	223.96	44%	262.35	31%	339.18	26%	7%
Soil conservation and remediation	2.48	0%	1.01	0%	17.78	1%	39%
Biodiversity protection	26.39	5%	29.30	3%	38.45	3%	6%
Environmental licensing, monitoring, and enforcement	8.16	2%	16.15	2%	66.90	5%	42%
Mining resources management	1.87	0%	4.93	1%	3.79	0%	12%
Forest resources management	23.80	5%	45.87	5%	73.73	6%	21%
Fisheries resources management	24.00	5%	25.64	3%	30.84	2%	4%
Water resources management	1.47	0.3%	30.09	4%	54.52	4%	83%
Other environmental management activities	29.11	6%	27.48	3%	54.14	4%	11%
TPEE	510.70		851.75		1,294.53		

Source: Authors' elaboration based on IDB (2014).

¹⁷ One of the main contributing factors to the increase in wastewater expenditure has been a greater level of pressure on the environment resulting from urban population growth. The share of urban population went from 72.6 to 78.3 percent.

3.5 DISTRIBUTION BY GOVERNMENT LEVEL

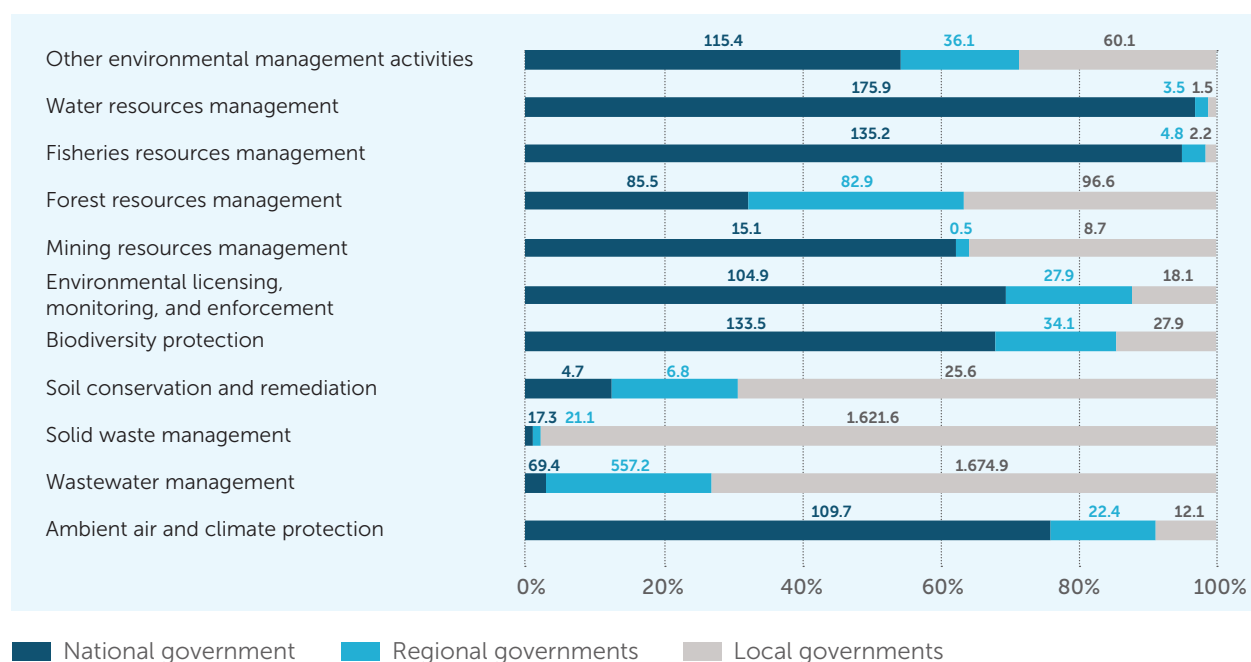
The distribution of expenditure by activity and level of government reveals a clear trend (Figure 6). Local governments spend the majority of their budgets on wastewater and solid waste management, whereas the national government primarily spends on the remaining environmental activity categories.

Regional governments spend primarily on activities related to wastewater management, forest resources management, biodiversity protection, and environmental licensing. These categories comprise 90 percent of the total expenditure.

The national government has spent mainly on activities such as environmental licensing, monitoring, and enforcement; ambient air and climate protection; and fisheries, water, and mining resources management. National government allocations for these activities are greater than 70 percent of TPE, primarily for regulatory and supervisory activities.

FIGURE 6

DISTRIBUTION OF PUBLIC ENVIRONMENTAL EXPENDITURE BY TYPE OF ACTIVITY AND GOVERNMENT LEVEL, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



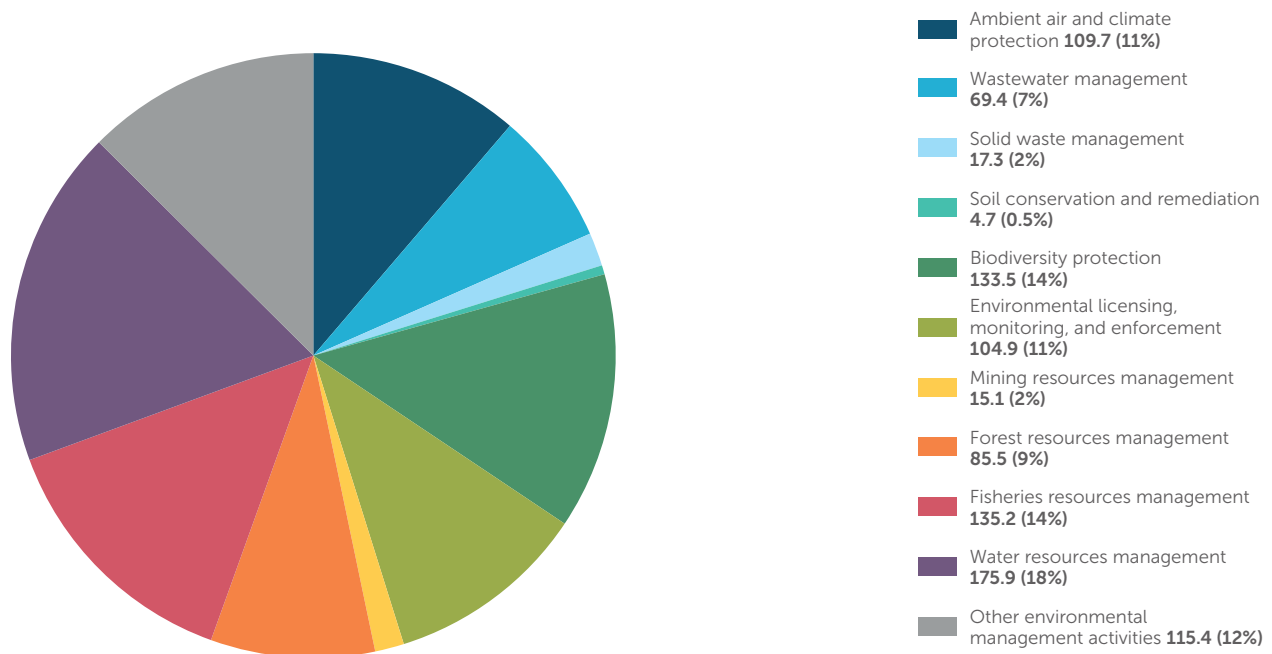
Source: Authors' elaboration based on IDB (2014).

National Government. Natural resource management constitutes 56 percent of the TPEE of the national government. Water resources management accounted for 18.5 percent of the expenditure, at US\$176 million; fisheries resources management came in at 14.2 percent, or US\$135.2 million; biodiversity protection had 14.1 percent, or US\$133.5 million, and forest resources management accounted for 9 percent of the expenditure, or US\$85.5 million (Figure 7).

Environmental quality protection received approximately 30 percent of total environmental spending. Environmental licensing, monitoring, and enforcement activities had the largest share, 10.8 percent of spending, at US\$104.9 million; air and climate protection received 11.3 percent of spending, at US\$109.7 million; and wastewater management received 7.1 percent, at US\$69.4 million. The remaining spending categories received 12.2 percent of total expenditures.¹⁸

FIGURE 7

DISTRIBUTION OF ENVIRONMENTAL EXPENDITURE BY TYPE OF NATIONAL GOVERNMENT ACTIVITY, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014).

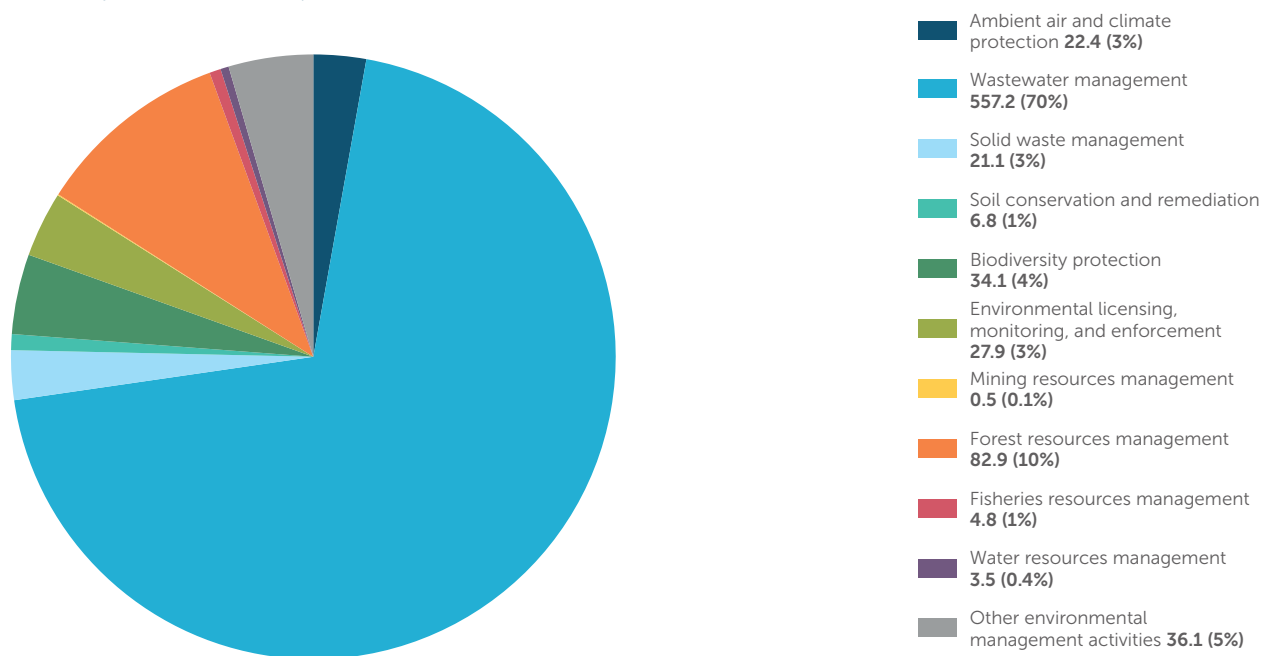
¹⁸ The category "other environmental protection activities" contains activities of an environmental nature for which it was not possible to define the purpose of their activity.

Regional Governments. Wastewater management received 70 percent of the total environmental expenditure of the regional governments, at US\$557.2 million. Three other activities stand out as well: forest resources management, which received 10 percent of all spending, or US\$82.9 million; biodiversity protection, which received 4 percent, or US\$34.1 million; and environmental licensing, which received 3 percent, or a total of US\$27.9 million (Figure 8).

Other significant activities, albeit with lower expenditure levels, include solid waste management and ambient air and climate protection, which jointly account for 6 percent of regional expenditures, or US\$43.5 million.

FIGURE 8

DISTRIBUTION OF ENVIRONMENTAL EXPENDITURE BY TYPE OF REGIONAL GOVERNMENT ACTIVITY, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)

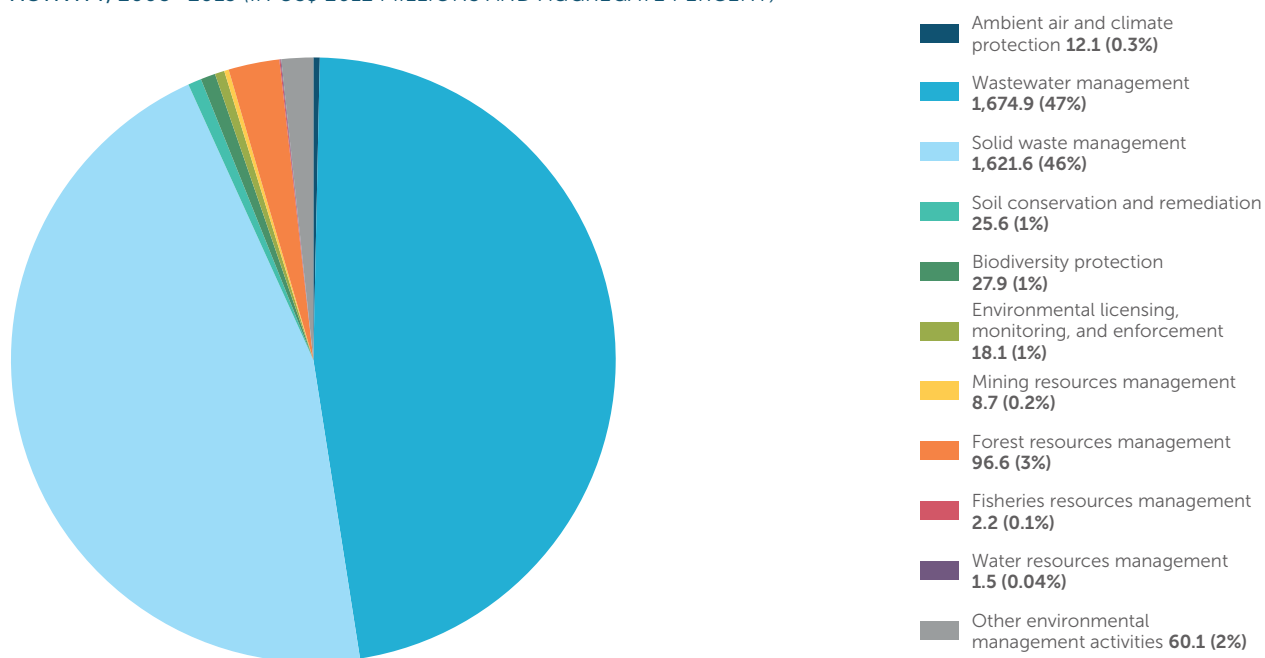


Source: Authors' elaboration based on the IDB (2014).

Local Governments. Two activities accounted for 93 percent of the environmental expenditure at the local level: waste water management (US\$1.6749 billion, or 46.7 percent) and solid waste management (US\$1.6216 billion, or 46.3 percent). Other significant activities include forest resources management, with US\$96.6 million (2.7 percent of the total) and biodiversity protection, with US\$27.9 million (0.8 percent) (Figure 9).

FIGURE 9

DISTRIBUTION OF ENVIRONMENTAL EXPENDITURE BY TYPE OF LOCAL GOVERNMENT ACTIVITY, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



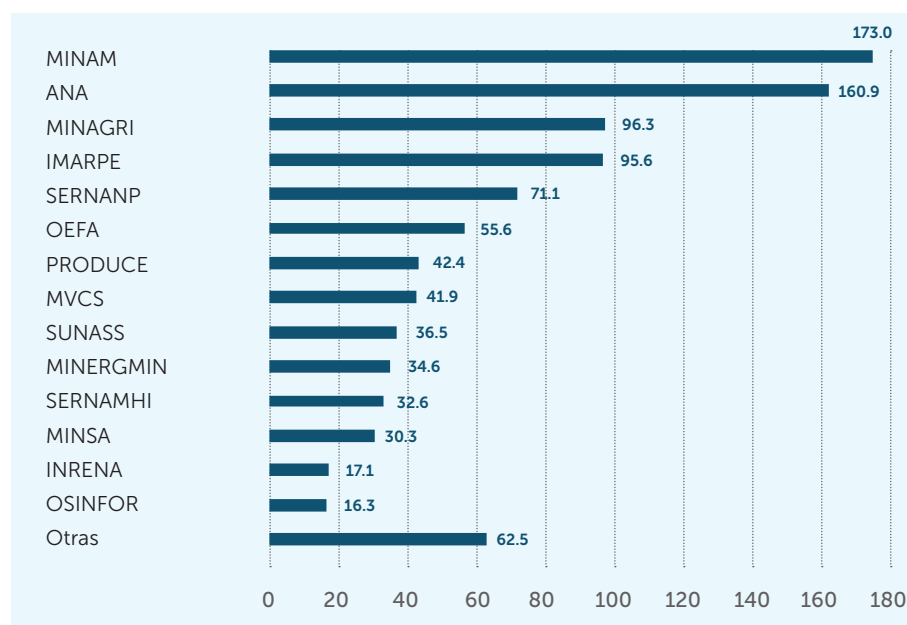
Source: Authors' elaboration based on IDB (2014).

3.6 TOTAL PUBLIC ENVIRONMENTAL EXPENDITURE BY NATIONAL GOVERNMENT AGENCY

A considerable number of national government agencies have executed environmental expenditures exceeding US\$30 million during the 2008–2013 period (Figure 10). MINAM, the country's governing body for environmental management, had the highest expenditures, at US\$173 million. OEFA, the main entity for environmental monitoring and enforcement, received allocations of US\$55.6 million. SENAMHI received US\$32.6 million for environmental monitoring.¹⁹ MINSA received US\$30.3 million for activities related to environmental health. Although most spending on environmental sanitation occurs at a decentralized level, two institutions stand out: the Ministry of Housing and Construction, with US\$41.9 million, and the SUNASS, with US\$36.5 million.

FIGURE 10

DISTRIBUTION OF PUBLIC ENVIRONMENTAL EXPENDITURE BY NATIONAL GOVERNMENT AGENCY, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014).

¹⁹ It was not possible to separate some of SENAMHI's expenditures whose purpose is not strictly environmental, such as meteorological monitoring.

The following agencies received significant allocations of public resources to manage natural resources in the country: ANA received US\$161 million for water resources management, IMARPE and PRODUCE received US\$96 and US\$42 million, respectively, for fisheries resources management. The Ministry of Agriculture received US\$96 million and OSINFOR US\$16 million for forest resource management. Lastly, SERNANP received US\$71 million for biodiversity protection.

3.7 PUBLIC ENVIRONMENTAL EXPENDITURE BY CURRENT AND CAPITAL SPENDING AND GENERAL EXPENDITURE

Approximately 74 percent (US\$3.559 billion) of the funds executed between 2008 and 2013 were capital expenditures and 26 percent (US\$914.7 million) current expenses.²⁰ This distribution is strongly skewed by the large share that wastewater management occupies within the set of environmental activities, since this type of activity mostly requires high levels of physical investment. This is evident when current and capital expenditures are broken down by level of government and type of activity.

Regional government expenditures on the environment focus mainly on physical investment. They executed 91 percent of capital expenses (US\$709.8 million) and 9 percent of current expenses (US\$66.7 million). Local governments have a similar profile executing 94 percent (US\$1.8095 billion) of capital expenses and 16 percent of current expenses (US\$118.2 million).

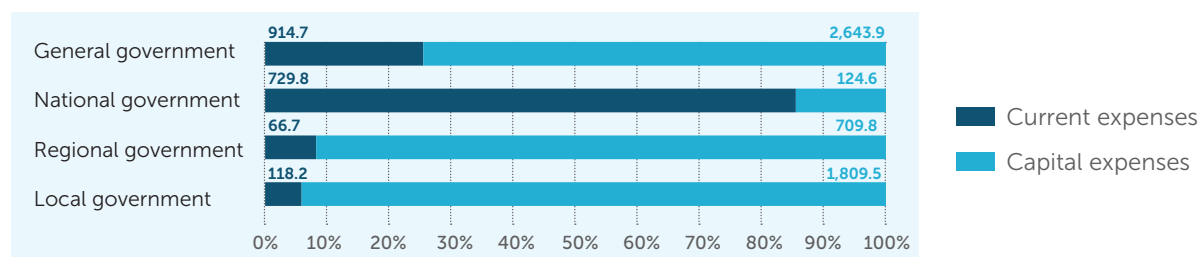
The national government had a different profile, executing 15 percent of capital expenses (US\$124.6 million) and 85 percent of current expenses (US\$729.8 million) (Figure 11). This is consistent with its regulatory and enforcement responsibilities rather than a direct role as an investor.

Figure 12 shows the expenditure modalities by type of environmental activity. Most capital spending is allocated to wastewater management, soil

²⁰ General administrative expenditures were not included, nor were solid waste management expenditures, as there is no differentiation in the expenditure category. The sum total of items in this section does not coincide with the total environmental expenditure.

FIGURE 11

DISTRIBUTION OF PUBLIC ENVIRONMENTAL EXPENDITURE IN CURRENT AND CAPITAL EXPENDITURE, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014).

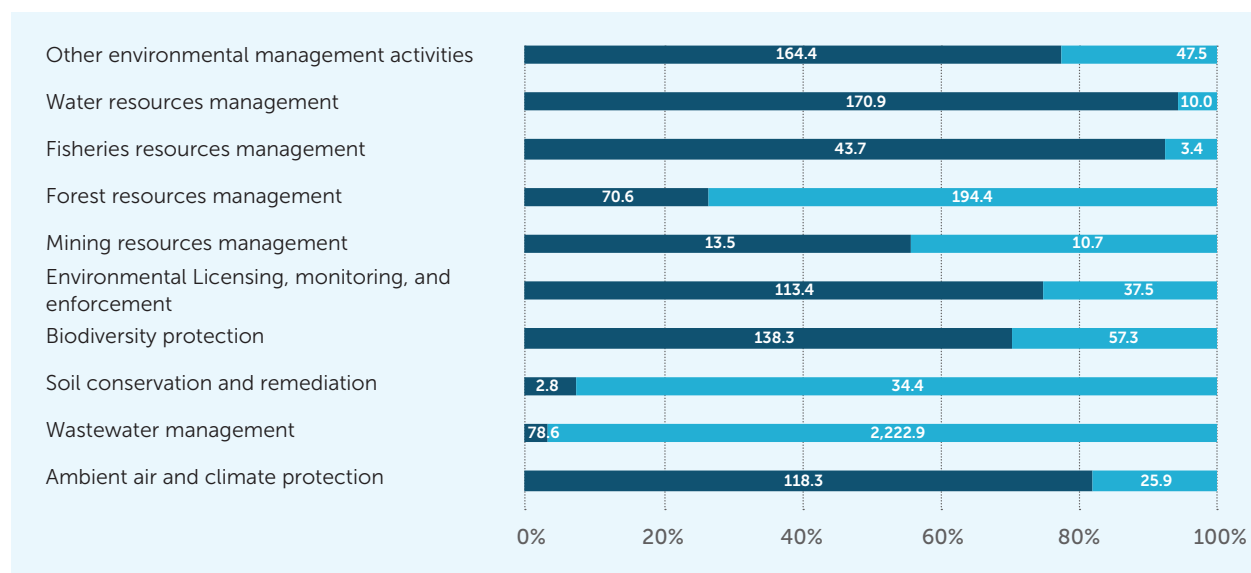
conservation, and forest resources management, with 97 percent, 93 percent, and 73 percent, respectively.²¹ Water resources management, fisheries resources management, air protection, environmental licensing, and biodiversity protection require a larger share of current expenses, utilizing 94 percent, 93 percent, 82 percent, 75 percent, and 71 percent, respectively.

A careful look at the composition of expenditure by type indicates that aggregate expenditures at all government levels can be broken down into US\$2.621 billion for nonfinancial investment acquisitions (81 percent); US\$521.4 million for personnel, pensions, and social liabilities and services (16 percent); and US\$100.8 million (3 percent) were spent on donations, transfers, and others (Figure 13). Most nonfinancial asset acquisition is carried out by the local and regional governments, that is, 93 and 90 percent, respectively. In contrast, most national government expenditure is for personnel and their liabilities, at 63 percent.

²¹ The flow of services derived from activities with a high percentage of capital expenditure is generally lower than the level of expenditures. Annualized expenditures can potentially be calculated to properly account for this difference. This estimation will take into account both current expenditures and the levelized capital costs.

FIGURE 12

CURRENT AND CAPITAL EXPENSES BY TYPE OF ACTIVITY
(IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)

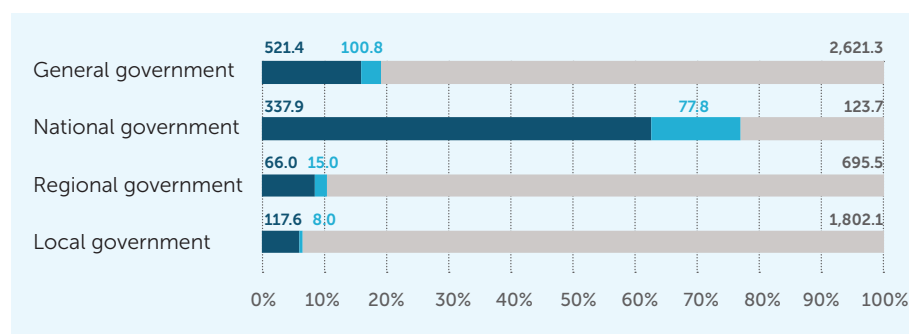


■ Current expenses ■ Capital expenses

Source: Authors' elaboration based on IDB (2014).

FIGURE 13

DISTRIBUTION OF TOTAL PUBLIC ENVIRONMENTAL EXPENDITURE BY TYPE OF EXPENSE, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



■ Personnel, social services and goods and services ■ Donations and transfers ■ Nonfinancial asset acquisition

Source: Authors' elaboration based on IDB (2014).

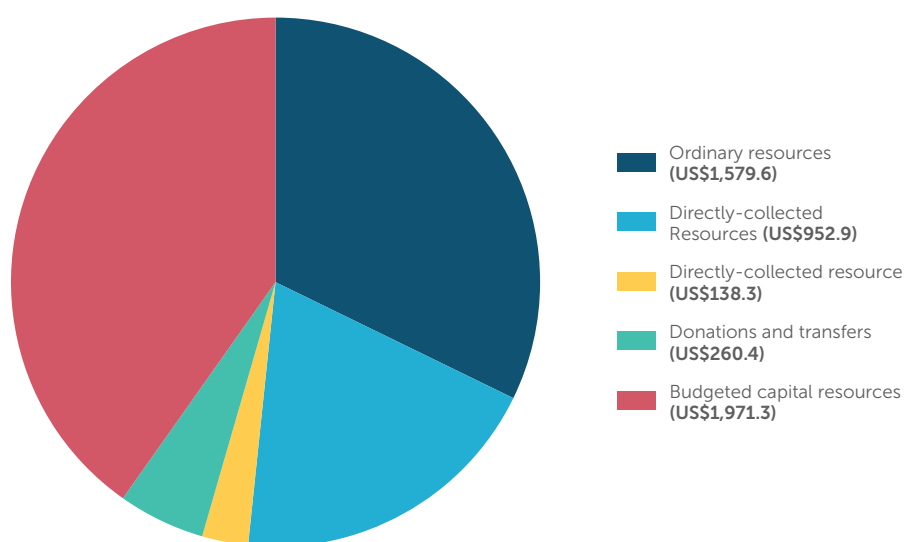
3.8 TOTAL PUBLIC ENVIRONMENTAL EXPENDITURE BY SOURCE OF FINANCING

As Figure 14 shows, financing sources of environmental activities varied throughout the period of analysis.²² The majority came from budgeted capital resources (40 percent or US\$1.9713 billion)²³ and ordinary resources (32 percent or US\$1.5796 billion).²⁴

Directly collected resources sustained 20 percent (US\$952.9 million) of environmental spending,²⁵ donations and transfers 5 percent (US\$260.4 million), and foreign credit only 3 percent (US\$138.3 million).

FIGURE 14

ENVIRONMENTAL EXPENDITURE BY FINANCING SOURCE, 2008–2013
(IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014).

²² General administrative expenditures were not included, nor were solid waste management expenditures, as there is no differentiation in the expenditure category. The sum total of items here does not coincide with the total environmental expenditure.

²³ Budgeted capital resources comprise the following categories: capital contributions, municipal compensation fund, municipal taxes, license fees and excess royalties, royalties, customs duties.

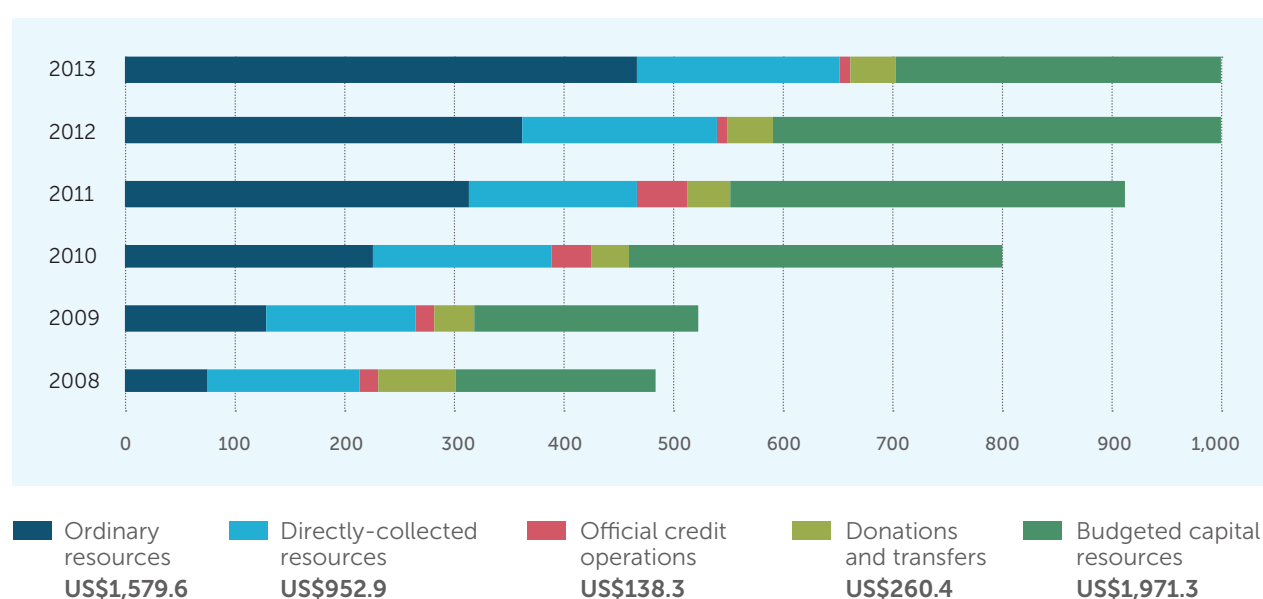
²⁴ Ordinary resources correspond to tax revenue and other concepts.

²⁵ Directly collected resources include revenue generated by public entities and directly administered by them, including property taxes, duties, sale of goods and provision of services, among others, as well as any revenue corresponding to them pursuant to current legislation.

The evolution of financing sources between 2008 and 2013 reveals relative stability in revenue stemming from ordinary resources and a significant increase in budgeted capital resources, which include the fees associated with the exploitation of natural resources (mining, energy, hydrocarbons, fisheries). Budgeted capital resources rose from US\$181.6 million in 2008 to US\$466.3 million in 2013. Likewise, direct revenue collection from licenses and other permits increased from US\$139.4 million in 2008 to US\$183.9 million in 2013 (Figure 15).

FIGURE 15

EVOLUTION OF ENVIRONMENTAL EXPENDITURE BY FINANCING SOURCE, 2008–2013
(IN US\$ 2012 MILLIONS)

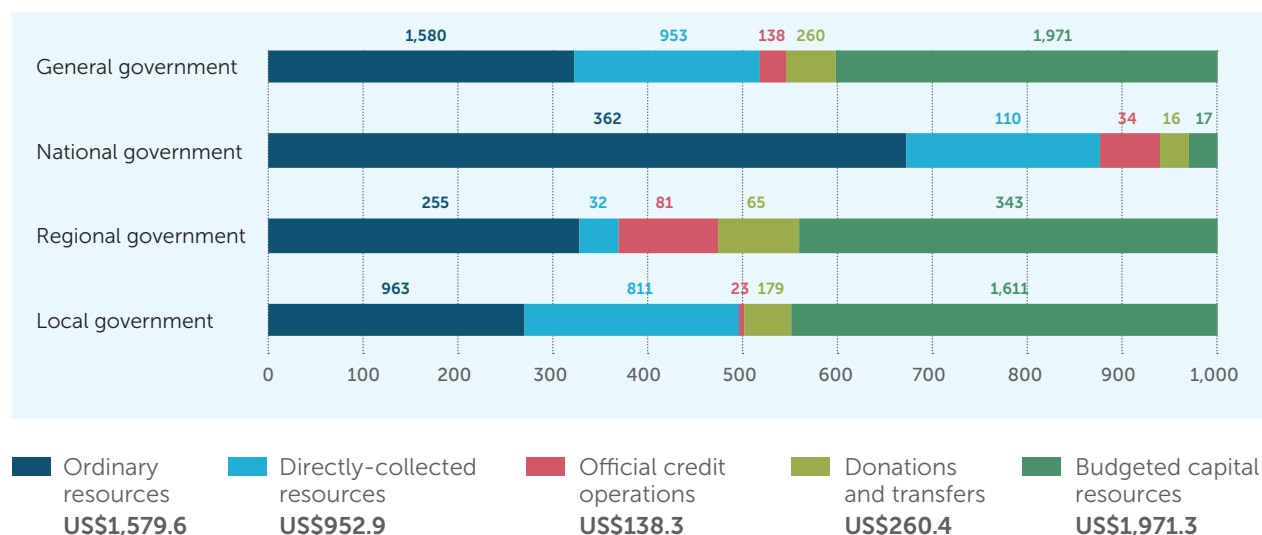


Source: Authors' elaboration based on IDB (2014).

The financing sources by level of government show the importance of revenue from natural resource exploitation in financing local and regional governments, accounting for up to 45 percent of expenditures (Figure 16). The primary financing source for the national government is ordinary resources (67 percent), followed by directly collected resources (20 percent).

FIGURE 16

FINANCING SOURCES BY GOVERNMENT LEVEL, 2008–2013 (IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014).

3.9 THE GEOGRAPHIC DISTRIBUTION OF ENVIRONMENTAL EXPENDITURE

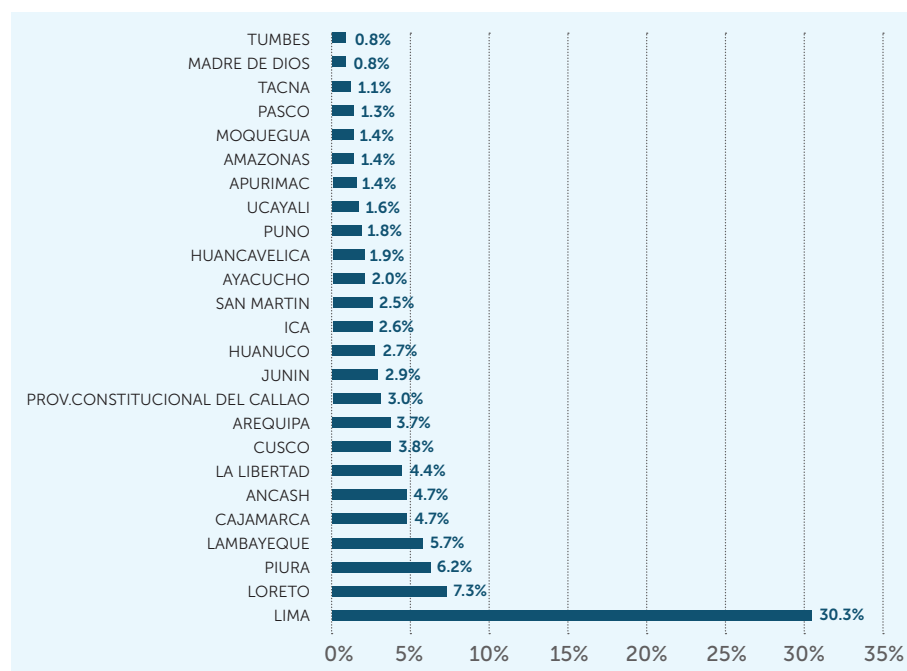
The analysis of the geographic location of environmental expenditure in the country provides a perspective on priorities in allocating public resources for environmental management.²⁶ The Department of Lima executed the greatest share of funds, around 30 percent. However, all expenditures executed by national government entities based in Lima are attributed to this department, even if such funds benefit another department.

After Lima, the following departments account for the highest shares of expenditure: Loreto, 7.3 percent; Piura, 6.2 percent; Lambayeque, 5.7 percent, Ancash and Cajamarca, 4.7 percent each. The departments that received the smallest share of funds for environmental activities are: Tumbes and Madre de Dios, 0.8 percent each; Tacna, 1.1 percent; Pasco, 1.3 percent, and Moquegua 1.4 percent (Figure 17).

²⁶ This does not include nondifferentiated general administrative expenditures; therefore, the sum of the line items does not equal the total environmental expenditure.

FIGURE 17

GEOGRAPHIC DISTRIBUTION OF ENVIRONMENTAL EXPENDITURE, 2008–2013 (IN AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014) and the National Institute of Statistics and Informatics (Instituto Nacional de Estadísticas e Informática, or INEI).

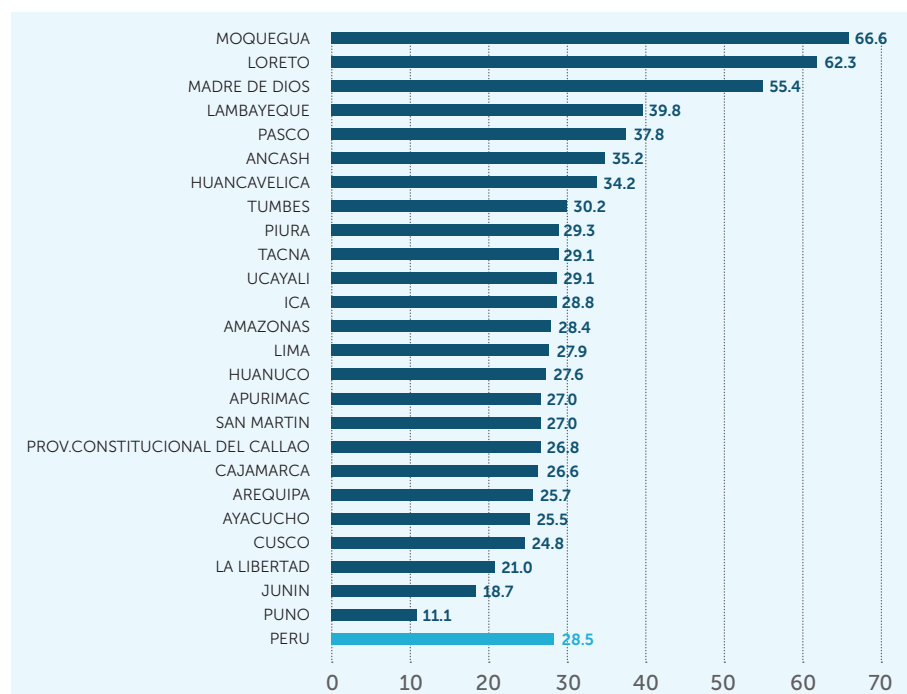
Expenditure per capita by department shows another relative weighting of the geographic distribution of environmental spending (Figure 18). The departments that received the greatest average allocation per capita during the period were Moquegua (US\$66.6), Loreto (US\$62.3), Madre de Dios (US\$55.4), Pasco (US\$37.8), Ancash (US\$35.2), and Huancavelica (US\$34.2). In contrast, the following departments received the smallest allocation of environmental expenditure per capita: Puno, (US\$11.1), Junín (US\$18.7), and La Libertad (US\$21).

The amount of environmental expenditure as a share of departmental GDP is also uneven in the country.²⁷ The departments that have an average annual environmental expenditure greater than 1 percent of departmental GDP are Loreto, Apurímac, Huanuco, Huancavelica, Lambayeque, Amazonas, San Martín, and Ayacucho. Environmental spending accounts for less than 0.5 percent of the GDP in the departments of Arequipa, Lima, and Moquegua (Figure 19).

²⁷ The Constitutional Province of Callao is not included.

FIGURE 18

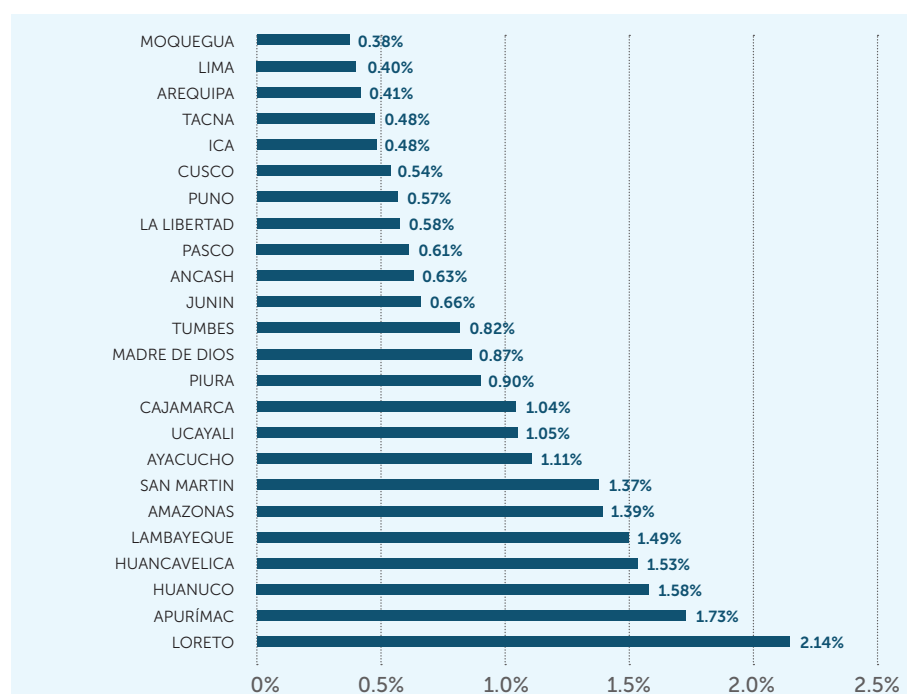
ENVIRONMENTAL EXPENDITURE PER CAPITA AND BY DEPARTMENT, 2008–2013
(IN US\$ 2012 MILLIONS AND AGGREGATE PERCENT)



Source: Authors' elaboration based on IDB (2014) and INEI.

FIGURE 19

ENVIRONMENTAL EXPENDITURE PERCENTAGE OF THE DEPARTMENTAL GROSS DOMESTIC PRODUCT, 2008–2013 (IN AVERAGE US\$ 2012)



Source: Authors' elaboration based on IDB (2014) and INEI.

3.10 THE ENVIRONMENTAL EXPENDITURE OF STATE-OWNED ENTERPRISES²⁸

There are several state-owned enterprises that conduct environmental protection and management activities. Expenditure data were obtained for the main state-owned enterprises that conducted environmental protection activities in 2011 and 2012. The companies identified were EGEMSA, SEDAPAL, Activos Mineros, SIMA Perú, EGESUR, ENAPU, SIMA Iquitos, ELECTRONORTE, and HIDRANDINA.

Environmental expenditure by state-owned enterprises was estimated at US\$192.2 million in 2011, and US\$105.3 million in 2012. Most of this spending was for wastewater treatment.²⁹ SEDAPAL executed 98 percent and 96 percent of the expenditures in each of these years, respectively.

Soil and water conservation was conducted by Activos Mineros for its exploitation completion remediation activities. Relatively low levels of expenditure were identified for these activities, US\$2.9 million and US\$4.3 million, in 2011 and 2012, respectively. Other environmental activities with identified expenditure were solid waste management, general environmental management, and water resource management.

Spending by state-owned enterprises accounted for an additional 22 percent and added 11 percent to the total environmental expenditure by the national government in 2011 and 2012. In the case of wastewater treatment, expenditure by state-owned enterprises, in this case SEDAPAL, accounted for an additional 38 percent and 18 percent to national government spending on this type of activity (Table 5).

²⁸ This is the first study in Peru that estimates the environmental expenditures of state-owned enterprises. Since data were obtained for a limited period of time, the data presented are not included in the total expenditure analysis.

²⁹ This includes water supply and sanitation expenditures.

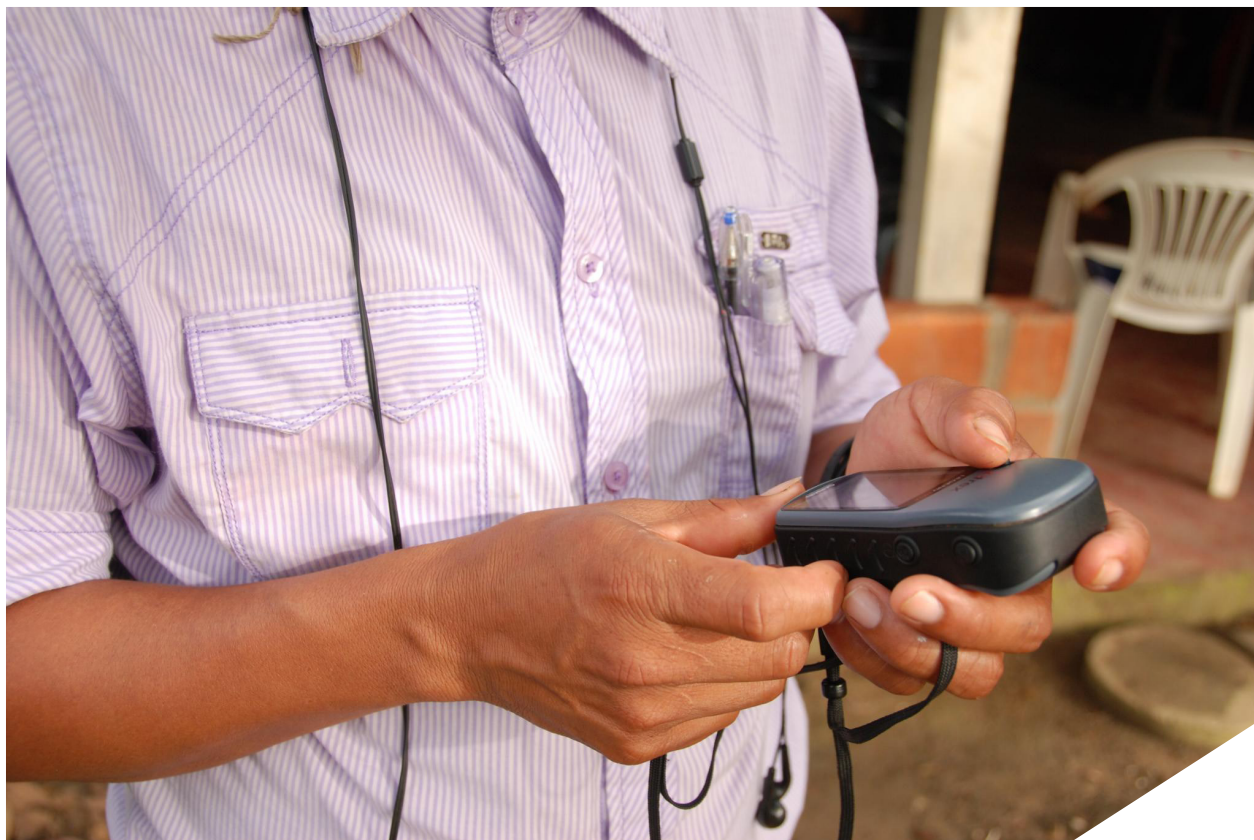
TABLE 5

ENVIRONMENTAL EXPENDITURE IN STATE-OWNED ENTERPRISES, 2011–2012 (IN AVERAGE US\$ 2012)

ENVIRONMENTAL ACTIVITY	STATE-OWNED ENTERPRISES	2011	2012	TOTAL
Wastewater management	EGEMSA	10,553.7	—	10,553.7
	SEDAPAL	188,743,913.3	100,953,140.9	289,697,054.1
	Total	188,754,467.0	100,953,140.9	289,707,607.9
Solid waste management	EGEMSA	25,352.3	—	25,352.3
	EGESUR	44,128.1	—	44,128.1
	ENAPU S.A.	114,162.9	—	114,162.9
	SIMA IQUITOS	—	97,840.0	97,840.0
	Total	183,643.3	97,840.0	281,483.2
Soil and water protection	ACTIVOS MINEROS	2,971,371.8	4,289,623.5	7,260,995.3
	Total	2,971,371.8	4,289,623.5	7,260,995.3
Other environmental management activities	ELECTRONORTE	144,603.8	—	144,603.8
	HIDRANDINA	158,368.2	—	158,368.2
	SIMA-PERU	3,050.7	—	3,050.7
	Total	306,022.8	—	306,022.8
Water resources management	ELECTROPERU	27,958.6	—	27,958.6
	SEDAPAL	16,996.4	3,412.2	20,408.6
	Total	44,955.1	3,412.2	48,367.3
TOTAL		192,260,459.9	105,344,016.5	297,604,476.5

Source: Authors' elaboration based on IDB (2014).

/4/ Environmental Expenditure Quality Analysis



4. ENVIRONMENTAL EXPENDITURE QUALITY ANALYSIS

4.1 THE GOVERNMENT'S STRATEGIC OBJECTIVES AND PUBLIC ENVIRONMENTAL EXPENDITURE

The PLANAA lays out the government's strategic plans and priorities for environmental management (MINAM, 2011). The plan establishes a series of activities structured around seven priority areas: water, solid waste, air, forests and climate change, biodiversity, mining and energy, and environmental governance. It proposes monitoring indicators for each of these priority areas. While the PLANAA is a reference for the government's strategic goals, two key aspects limit its effectiveness as a planning tool: the lack of quantification of investment needs required to achieve the objectives of each line of action and the scant information available for establishing baseline impact and result indicators to be monitored.

Table 6 presents the evolution of public expenditure for the various areas of environmental management with the corresponding performance indicators and a selection of associated PLANAA indicators. While it is not possible to directly attribute improvements in environmental quality to the increase in expenditure during the period, a number of intermediate results are directly associated with publicly funded activities. The main results are summarized in the remainder of this section.

The commitment to strengthen environmental governance is best characterized by the 50 percent annual increase of expenditure earmarked for environmental enforcement and monitoring between 2008 and 2013. Total expenditure reached US\$147 million during this period, and it is tied to the operation of governing institutions such as MINAM and OEFA, as well as regional and local governments. The types of activities conducted were of a regulatory, monitoring, and enforcement nature, with a cumulative expenditure that amounted to less than 3 percent of the total. A total of 1,818 environmental licenses were granted during this period to mainstream environmental management into the various productive sectors. The recently formed OEFA applied 1,486 penalty procedures, collecting US\$55 million in sanctions. A large percentage of the sanctions were associated with the mining sector, as a result of noncompliance with environmental regulations. The number of environmental crimes and socio-environmental conflicts registered also confirms the challenges of incorporating environmental management into the country's economic development process.

Water pollution management received more than 46 percent of the total funds allocated by the government, reaching US\$2,481 million in expenditure during this period. Much of this expenditure was used to construct sewerage networks, which helped expand the network's coverage (from 77 percent to 84 percent in urban areas). The government also financed the construction and operation of wastewater treatment plants, thereby boosting the percentage of waste water treated (from 33 percent to 47 percent of water collected). Along with these investments, the government created a governing body, ANA, which introduced permits to discharge wastewater as a way to manage water pollution stemming from nondomestic sources. Although there is no reliable information on the evolution of the environmental quality of water bodies, available data indicate an excessive concentration of pollutants in more than 40 percent of watersheds in the country.

Air quality management is an area on which the government spent approximately US\$74 million during this period. This expenditure accounted for just 1.4 percent of the total and was focused on regulatory, monitoring, and enforcement-related activities. In a number of cities, such as Lima, policies were implemented to reduce the sulfur content in fuel, to change the vehicle energy matrix, to implement mass transportation systems, and to execute a vehicular emissions inspections program, among other activities (OECD, 2016).³⁰ The existing data reveal a decrease in the concentrations of the main pollutants (for example, 23 percent for PM10, 33 percent for SO₂) in Lima. However, there are still numerous periods throughout the year when air quality exceeds established environmental quality standards (EQS).

Solid waste management is the second-highest public expenditure category, with a cumulative total of US\$1.660 billion (31 percent of the total). Local governments have increased their expenditure at a rate of 11.5 percent annually. Both the coverage of collections services (from 83 percent to 86.7 percent) and the percentage of urban solid waste disposed in landfills (from 26 percent to 41 percent) increased during the period. While progress has been made in terms of solid waste disposal, the country has still fallen short of the goal of 50 percent set forth in the PLANAA.

The expenditure in **biodiversity protection** reached US\$195 million, or 3.7 percent of the total. A large percentage of the expenditure was earmarked for the SINANPE, which increased its coverage during this period (from 15.7 to 17.9 million hectares). The resources allocated to NPAs did not guarantee their proper functioning. Several studies estimated a deficit between 35 to 51 percent of the existing budgets. The amount collected from visi-

³⁰ For the purposes of the study, the possible public expenditure incurred in the ways mentioned was not quantified due to the difficulty of separating out air quality-related spending exclusively. In the majority of cases, the expenditures incurred do not have, as a primary objective, improving air quality but, rather, reducing travel time or operating costs.

tors increased during this period, from US\$2.3 to US\$3.4 million. However, the revenue generated does not entirely reflect the total value of goods and services provided by the ANPs beyond their touristic value. Furthermore, the system of protected areas has a limited coverage of the country's ecoregions and their biodiversity. It is estimated that more than 30 percent of species are not adequately protected by NPAs.

Biodiversity protection is related, to a large extent, to **forest resources management**. Peru's deforestation during this period threatened not only the conservation of forest stocks but also of biological diversity and ecosystems. Deforestation rates increased from an annual average of 99,000 hectares between 2003–2008 to 135,000 hectares during 2008–2013. Expenditures for forest resources management totalled US\$265 million during the period. The vast majority funded reforestation efforts: 153,000 hectares were successfully reforested. The deforestation rates observed, the reforestation rate, and the assignment of resources to this category have all fallen short of the goals established both in PLANAA and previous forest sector plans.

Lastly, **fisheries resources management** expenditures reached US\$164 million during this period. The primary activities funded were research, administration, and enforcement of fisheries activity. The decrease in anchovy biomass in recent decades has influenced the reduction in total annual landings in the period (from 7,362 to 5,948 metric tons). Increased pressure on resources has resulted in an increase in the percentage of overfished or collapsed species (from 34 percent to 53 percent). In 2008, the government introduced a system of individual quotas in anchovy fishing to ensure the sustainability of the country's most important fishery. Nevertheless, the public expenditure level is below international standards to guarantee proper resource management, particularly insofar as fisheries policy enforcement is concerned.

The following sections contain a more detailed analysis of each of the environmental management categories. Each contains information on public expenditures, a review of the main outcomes and results for the period, and conclusions on the challenges of increasing expenditure effectiveness.

TABLE 6

MAIN INDICATORS FOR THE GOVERNMENT'S STRATEGIC OBJECTIVES, PERFORMANCE, AND EXPENDITURE

SUBJECT AREA	CUMULATIVE PUBLIC EXPENDITURE 2008–2013 (IN US\$) (ANNUAL EXPENDITURE GROWTH) (% OF TOTAL PUBLIC EXPENDITURE)	PLANAA GOALS 2011–2021 INDICATORS SELECTED	MAIN PERFORMANCE INDICATORS
Environmental licensing, monitoring, and enforcement	147 million ^a (51% annually) (2.8% of the total)	30% of regional governments had environmental information systems in 2012. In 2017, 100% of traditional and small-scale mining implement environmental management instruments. In 2017, 50% of the country's regions have an environmental enforcement authority.	139 socio-environmental conflicts in 2013 (256 between 2008 and 2012) 5,077 environmental crimes between 2009 and 2012 1,818 environmental licenses issued between 2008 and 2013 US\$55 million in sanctions between 2011 and 2013 1,486 penalty procedures between 2011 and 2013
Water quality	2.481 billion (50% annually) (46.7% of the total)	In 2012, 30% of urban wastewater was treated. In 2017, 30% of property owners with discharge permits complied with the MPLs. Receiving bodies comply with water EQS.	1.07 million acute diarrheal disease cases in 201 (1.2 million in 2008) In 2013, 84.37% of the urban population had sewerage coverage. (77% in 2009) Service provider operating margin 8.82% in 2013 (22.5% in 2009)
Air quality	73.9 million (—) (1.4% of the total)	In 2017, 60% of the high-priority cities implemented action plans to improve air quality and complied with air-related EQS.	In 2013, there were 529,000 diagnoses of acute respiratory diseases. (862,000 in 2008) A decline in pollution concentrations in Lima (2007–2013). 29% PM ₁₀ / 43% PM _{2.5} 33% SO ₂ /16% NO ₂
Solid waste management	1.660 billion (11.5% annually) (31.2% of the total)	In 2012, 50% of municipal solid waste was managed, reused, or disposed of appropriately.	0.8 kg/inhab./day waste generated in 2013. (0.74 in 2009) In 2013, there was 86.7% garbage collection service coverage. (83% in 2009) In 2013, 41% of urban solid waste was disposed of appropriately. (26% in 2009) There was a 47% service collection deficit in 2013.

(continued on next page)

TABLE 6 (continued)

MAIN INDICATORS FOR THE GOVERNMENT'S STRATEGIC OBJECTIVES, PERFORMANCE, AND EXPENDITURE

SUBJECT AREA	CUMULATIVE PUBLIC EXPENDITURE 2008–2013 (IN US\$) (ANNUAL EXPENDITURE GROWTH) (% OF TOTAL PUBLIC EXPENDITURE)	PLANAA GOALS 2011–2021 INDICATORS SELECTED	MAIN PERFORMANCE INDICATORS
Biodiversity protection	195 million (7.6% annually) (3.7% of the total)	An increase of 50% of the value of the NPAs' good and/or services. The number of endangered flora and fauna species in 2017 remained steady at the 2012 levels. An increase of 10% in tourist visits to the NPAs in 2017.	In 2014, 186 species of fauna were classified as critically endangered or endangered. (94 in 2004) In 2013 there were 17.9 million hectares of protected areas (15.7 million ha. in 2008) US\$1.29/ha invested in ANPs in 2013 In 2013, 23% of ANP expenditures were funded through direct collection. (US\$2.6/visitor) US\$3.4 million collected and 1.3 million visitors to the ANPs in 2013. (US\$2.3 million collected and 600,000 visitors to the ANPs in 2009.)
Forest resources management	265 million (35% annually) (5% of the total)	A reduction of 50% in the average rate of deforestation in the 2000–2017 period. Forestation and reforestation in 50% of high-priority areas in 2017 (450,000 ha.)	813,000 hectares deforested during 2008–2013. (135,000 ha. deforested annually) 153,000 hectares reforested during 2008–2013. Average reforestation cost US\$778/ha.
Fisheries resources management	164 million (9.5% annually) (3.1% of the total)	In 2012, 20% of fisheries unloadings met the minimum species size.	5,948 metric tons of landings in 2013 (7,362 in 2009) In 2013, 53% of overfished or collapsed species (34% in 2008). The expenditure in 2013 was 1.3% of the production value. (0.9% in 2008)

4.2 ENVIRONMENTAL LICENSING, MONITORING, AND ENFORCEMENT



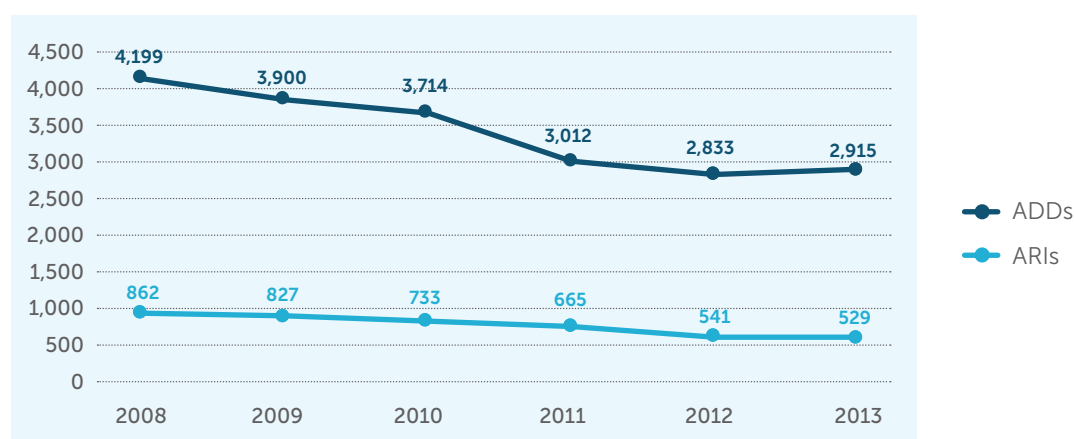
Advances in Environmental Management

Progress was made in some areas of environmental management during the period of analysis. The concentration of particulate matter (PM₁₀), sulfur dioxide (SO₂), and nitrogen dioxide (NO₂) in Peru's major cities decreased between 2008 and 2013 (MINAM, 2014a). The improved air quality contributed to a 32 percent reduction in cases of acute respiratory diseases in children under 5 years of age (Figure 20). Cases of acute diarrheal diseases also dropped by 30 percent. Although wastewater treatment increased during this period, there are still significant challenges in reducing concentrations of organic pollutants and toxic heavy metals in the country's rivers.³¹ Other areas of environmental management exhibited negative trends over the period. The total number of endangered wildlife species rose from 301 in 2004 to 535 in 2014 (MINAGRI, 2014). Deforestation rates also increased over the period, with an average of 130,000 hectares deforested annually.

³¹ More than 1,250 cases of heavy metal toxicity were registered in 2012. Most cases involved lead toxicity and were concentrated in the departments of Junín and Pasco (MINAM, 2014b).

FIGURE 20

ACUTE DIARRHEAL DISEASES AND ACUTE RESPIRATORY INFECTIONS DIAGNOSED IN CHILDREN UNDER 5 YEARS OLD, 2008–2013
(IN THOUSANDS OF CASES DIAGNOSED)



Source: MINSA.

The high percentage of social conflicts of environmental origin reveals the existing challenges for environmental management in the country. According to the Ombudsman's Office, 256 socio-environmental conflicts were registered between 2008 and 2012. The occurrence of environmental conflicts has been increasing countrywide. While conflicts were affecting 12 country regions in 2006, all 24 regions were affected by 2010.³¹ By the end of 2013, there were 139 environmental conflicts (active and latent), accounting for 64 percent of all social conflicts. Of these socio-environmental conflicts, 108 (74.5 percent) were related to mining activity and 18 (12.4 percent) to hydrocarbon activities, the second cause of conflict. Although more infrequent, there were also conflicts related to energy (7), forestry (4), waste and sanitation (3), agroindustry (2), and others (3). The departments most affected by conflict were Ancash (22), Apurímac (17), and Cajamarca (11).

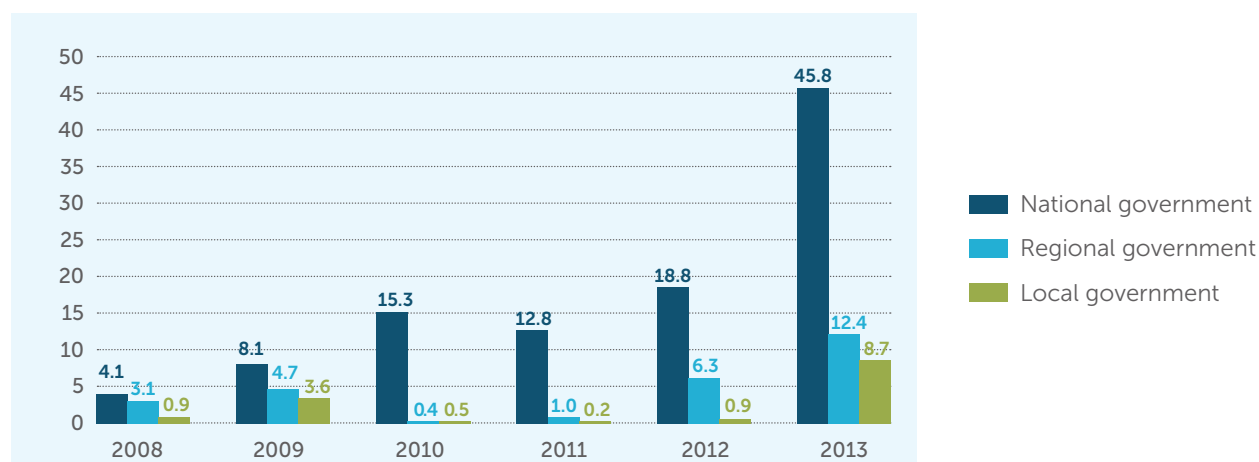
The rest of this section presents an analysis of environmental licensing, monitoring, and enforcement activities whose purpose is to prevent and control the environmental impacts of economic activities.³³ Key administrative results are presented together with the evolution of public expenditure allocated for these activities. The challenges to improving expenditure effectiveness are presented in the final part of the section.

³² The Ombudsman's Office started monitoring and reporting socio-environmental conflicts in 2006.

³³ Other activities that contribute to environmental quality management are presented in other sections herein.

FIGURE 21

EXPENDITURE ON ENVIRONMENTAL LICENSING, MONITORING, AND ENFORCEMENT
BY LEVEL OF GOVERNMENT, 2008–2013 (IN US\$ 2012 MILLIONS)



Source: Authors' elaboration based on IDB (2014).

Public Expenditure Evolution³³

Expenditure on environmental licensing, monitoring, and enforcement activities was concentrated in national government institutions. They executed US\$147.6 million between 2008 and 2013, 71 percent of the total allocations. Regional and local governments executed 18 percent and 12 percent of the total, with US\$27.9 and US\$14.8 million, respectively.³⁴ Expenditure within the national government has increased considerably over the past few years, reaching US\$45.8 million in 2013. This increase reflects the efforts to implement the National System of Environmental Assessment and Enforcement established by law in 2009 (Figure 21).

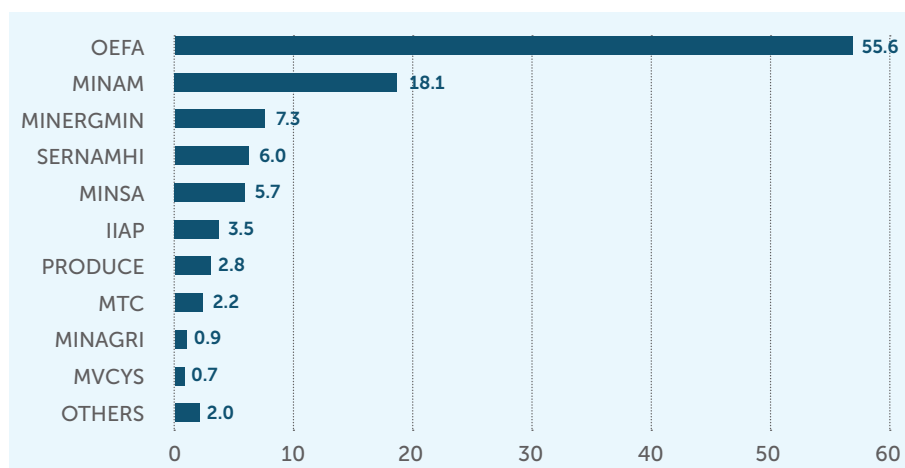
The largest national institutions with the largest executed budgets were OEFA (US\$55.6 million) and MINAM (US\$18.1 million), which are the system's governing bodies. Sectoral entities that govern licensing, monitoring, and enforcement activities include MINERGMIN (US\$7.3 million), MINSA (US\$5.7 million), PRODUCE (US\$2.8 million), Ministry of Transportation and Communication (Ministerio de Transportes y Comunicaciones, or MTC) (US\$2.2 million), and MINAGRI (US\$0.9 million). Finally, institutions solely responsible for monitoring were also allocated funds. The main institutions were SERNAMHI (US\$6 million) and The Peruvian Amazon Research Institute (Instituto de Investigación de la Amazonía Peruana, IIAP) (US\$3.5 million) (Figure 22).

³⁴ The team emphasizes the possibility of underestimating the spending associated with these activities since it was not possible to estimate some operating expenses of the institutions within the budgetary information system.

³⁵ The regional government of Loreto spent US\$ 13.8 million, constituting approximately half of all expenditures by regional governments.

FIGURE 22

EXPENDITURE ON ENVIRONMENTAL LICENSING, MONITORING, AND ENFORCEMENT
BY NATIONAL GOVERNMENT AGENCY, 2008–2013 (IN US\$ 2012 MILLIONS)



Source: Authors' elaboration based on IDB (2014).

Main Administrative Results

ENVIRONMENTAL LICENSES

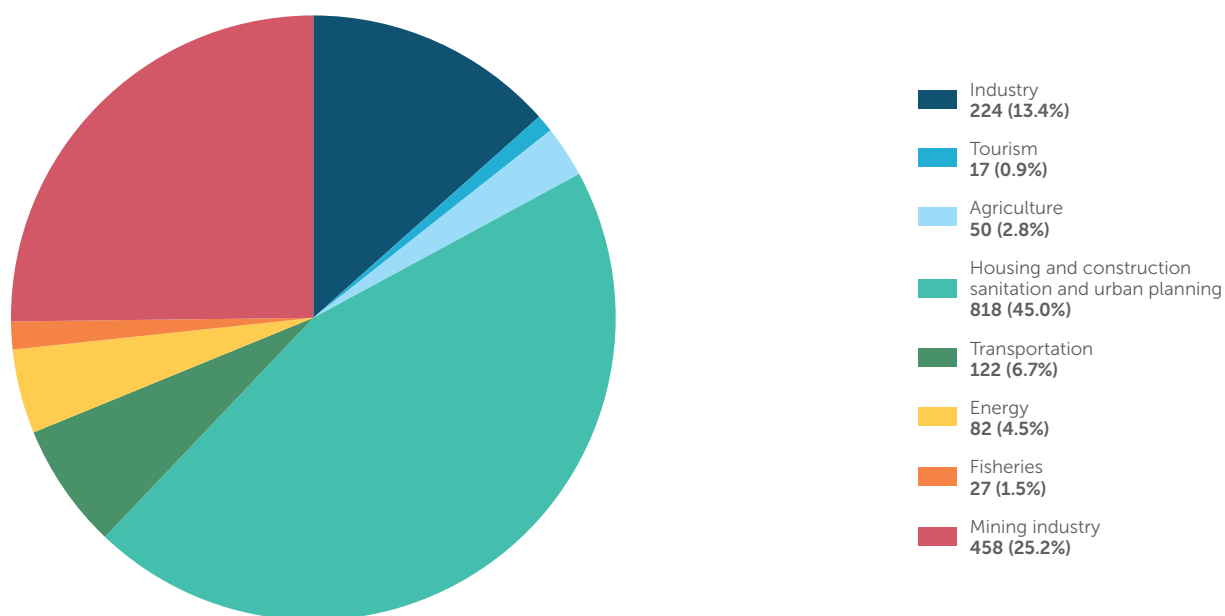
Between 2008 and 2012, MINAM approved 1,818 environmental impact assessments (EIAs) in Peru, most of which were conducted on urban planning and sanitation projects (45 percent), followed by mining (25 percent), industry (13 percent), and transportation projects (7 percent) (Figure 23).

Table 7 shows the distribution of licenses according to typology of environmental impact for all sectors between 2008 and 2012.³⁴ The most common study type is the environmental impact statement (EIS) (59 percent), followed by the detailed environmental impact assessment (EIAd) (25 percent), and the semi-detailed environmental impact assessment (EIAsd) (16 percent). The EIAd category primarily comprised energy, agricultural, and industrial projects; all of the fisheries projects underwent EIAsd; and tourism initiatives and those related to urban planning and sanitation services underwent an EIS.

³⁶ Out of a registry of 1,818 studies with data.

FIGURE 23

ENVIRONMENTAL LICENSES APPROVED BY SECTOR, 2008–2012



Source: MINAM and DGP NIGA.

TABLE 7

DISTRIBUTION OF EIA BY TYPOLOGY AND ECONOMIC SECTOR, 2008–2012

	EIS	EIA _{sd}	EIA _d	TOTAL
Agriculture	8	7	35	50
Tourism	12	5	—	17
Mining Industry	217	91	150	458
Energy	—	8	74	82
Industry	117	3	124	244
Fisheries	—	27	—	27
Transportation	49	29	44	122
Housing, construction, sanitation, and urban planning	675	110	33	818
TOTAL	1,078	280	460	1,818

Source: MINAM and DGP NIGA.

Notes: The EIS is considered for projects that have low environmental impact. EIA_{sd} and EIA_d are used for projects with potentially greater impact to the environment. EIA_d are used for projects with the greatest potential impact.

ENVIRONMENTAL MONITORING AND ENFORCEMENT

The OEFA is the governing body of the National System of Environmental Assessment and Enforcement in Peru. This body oversees hydrocarbon, mining, industry, and fisheries activities. Between 2011 and 2013, supervisions in these sectors rose from 1,042 to 2,220, respectively. The OEFA also increased the number of supervisions of public entities, from 249 in 2011 to 631 in 2013.

The penalties imposed by the Court of Environmental Enforcement of OEFA grew during the period of analysis, reaching US\$47.7 million in 2013. More than 64 percent of the total value of the penalties was levied on the mining sector and 30 percent on the hydrocarbon sector (Table 8). Total revenue collected from penalties between 2011 and 2013 was US\$ 55 million, almost a third of public expenditure executed in the period (US\$ 147 million). The number of sanctioning procedures increased from 150 in 2011 to 1,486 in 2013.

TABLE 8

PENALTY AMOUNTS BY SECTOR (IN US\$)

SECTOR	2011	2012	2013
Mining	2,562,661	22,138,411	24,936,415
Electricity	—	95,928	1,707,953
Fisheries	—	1,089,915	1,085,333
Hydrocarbons	861,817	2,281,348	19,999,403
Total penalties	3,424,478	25,605,601	47,729,104
Number of proceedings	150	643	1,486

Source: OEFA (2013) and authors' calculations.

Note: The responsibility for monitoring the fisheries sector was transferred to OEFA in 2012.

CRIMINAL PROCEDURE FOR ENVIRONMENTAL CRIMES

The Office of the Attorney General has a body of environmental prosecution offices, created in March 2008, which are responsible for developing procedures against environmental crimes. There are currently 27 of these offices, as well as 15 crime prevention units with jurisdiction in the areas that do not yet have one.

Between 2009 and 2012, there were 5,077 recorded cases of environmental crimes, 37 percent of which were categorized as crimes against forests, 23 percent for environmental pollution, without specifying the origin, and 21 percent for the illegal trafficking of timber forest products (Table 9).

TABLE 9

TYPE AND NUMBER OF ENVIRONMENTAL CRIMES PRESENTED, 2009–2012

TYPE OF VIOLATION	NO.	
Environmental pollution	1,164	23%
Crimes against forests	1,891	37%
Illegal trafficking of timber forest products	1,088	21%
Predation and illegal trafficking of wild flora and fauna	532	10%
Illegal mining	158	3%
Others	244	5%
Total	5,077	

Source: Ministry of the Environment, Public Prosecutor's Office.

Challenges to Increasing Expenditure Effectiveness

Public expenditure on environmental licensing, monitoring, and enforcement activities increased significantly between 2008 and 2013. Although the increased expenditure was reflected in the administrative results, several factors limit its effectiveness. Such factors are related to the design of the institutional framework, the assessment and enforcement system, and the lack of environmental data.

The institutional framework has become increasingly complex, leading to conflicts of jurisdiction in environmental management, thus limiting the effectiveness of the expenditure. Despite the creation of MINAM and OEFA as governing bodies, sectoral ministries have retained responsibilities in relation to environmental impact assessment procedures. Subnational governments have been assigned responsibilities for licensing and enforcement coordination with regional and local governments. This has been limited by the lack of technical capabilities at the local level and the minimal presence of MINAM in the territory.

The National EIA allocates responsibilities to several competent authorities, namely, MINAM,³⁷ the national sectoral authorities, and the regional and local authorities. The sectoral authorities, through their environmental bodies, are mainly responsible for implementing the EIA system.³⁸ When the task of implementing the EIA system is given to sectoral entities outside of

³⁷ MINAM's functions are carried out through the General Directorate of Environmental Management Policies, Standards, and Instruments (Dirección General de Políticas, Normas e Instrumentos de Gestión Ambiental, or DGPNI), responsible for administering the national environmental impact assessment system; approving the strategic environmental assessments of policies, plans, and programs; and evaluating at random the environmental impact studies approved by the competent authorities.

³⁸ The sectoral bodies are responsible for assigning categories based on environmental risk, drafting the reference terms, and granting environmental certifications, except in the case of category III, which was transferred to SENACE in 2014.

the environmental authority, without sufficient coordination with it, implementation may be affected by interests other than strictly environmental ones. This limits its effectiveness and generates jurisdictional problems in its administration, with consequences such as the following: (i) difficulty in handling possible pressures and conflicts of interest; (ii) no consideration for cumulative impacts; and (iii) difficulty in optimizing human and material resources, failing to take advantage of economies of scale when dispersing to the institutions involved.

In addition to weaknesses in the application of the environmental licensing system, there is also a lack of institutional capacity for monitoring and enforcement. During the period of analysis, the number of national enforcement and control entities has grown and they have increasingly been given more resources, broadening their presence in the country. Nevertheless, the regional and municipal governments still lack the sufficient resources and capacities to perform the functions transferred to them for issuing environmental certifications and enforcing certain projects. Moreover, a high percentage of the OEFA and local supervisory entities' budget is financed with revenues collected from fines.³⁹ This can jeopardize the appropriate application of their supervisory-sanctioning function when there is pressure to collect revenue to support the institution's budget.

The lack of data on the physical, chemical, and biological characteristics of natural resources and environmental conditions has significantly compromised environmental management capacity during the period of analysis. First, the lack of baseline data on local conditions and sources of contamination limits the effectiveness of the proposed corrective measures as well as their appropriate monitoring. This has affected the effectiveness of the licensing system, in addition to the design of and compliance with EQS and maximum permissible limits (MPLs). Second, the lack of data generates voids with respect to the burden of proof, hindering effective judicial procedures.

Lastly, the design of the penalty system has also limited the effectiveness of enforcement activities. For example, during the period of analysis, the type of violations and scale of penalties for a violation of the MPLs did not correlate to the environmental damage caused or the cost of restoring environmental quality. It was not until late 2013 that OEFA revised its penalty scheme to adjust the damage severity scale and possible aggravating factors.

³⁹ In 2012, the revenues collected by OEFA itself (US\$7.03 million) constituted 53 percent of the agency's executed expenditure (US\$13.08 million).

4.3 WATER RESOURCES AND WASTEWATER MANAGEMENT



Status of the Quantity and Quality of Water Resources

RESOURCE AVAILABILITY

Water resources in Peru reached 2.48 billion cubic meters (m^3) in 2012 (ANA, 2015). In relative terms, the annual water supply was more than 64,000 m^3 per capita, which is well above the regional average of 22,000 m^3 per capita. The water supply increased from 215 billion m^3 in 2008 to 546 billion in 2013, due to additional groundwater supplies.

Despite the apparent abundance of water, its unequal distribution in space and time has created water stress in areas where the majority of the population and the country's main centers of economic activity are located. The Pacific region receives 1.7 percent of the total water supply and is home to 62 percent of the population (including Lima) and 81 percent of Peru's consumptive demand. This region is subject to considerable water stress, with an annual availability of 1,866 m^3 per capita. The two other hydrographic regions of Peru exhibited positive water balance sheets, especially the Amazon region, which contains 98 percent of Peru's available water resources (Table 10).

The total annual water demand for consumption purposes reached 26,000 m³. Agricultural uses required the most water (88 percent), followed by human consumption (10 percent) and mining (1.5 percent). Nonconsumption purposes totaled approximately 23,000 m³ and came from the energy sector (99 percent).

TABLE 10

NATIONAL WATER BALANCE BY HYDROGRAPHIC REGION, 2012

HYDROGRAPHIC REGION	SUPERFICIAL NATURAL WATER RESOURCES (m ³ /year)	CONSUMPTIVE DEMAND (m ³ /year)	WATER BALANCE (m ³ /year)	POPULATION (inhab.)	WATER STRESS LEVEL (m ³ /inhab./year)
Pacific	34,136	21,153	13,933	18,801,416	1,866
Amazon	1,895,226	3,707	1,885,020	10,018,788	189,072
Titicaca	6,259	1,160	5,099	1,246,975	5,019
Total	1,935,621	26,020	1,909,601	30,067,179	64,377

Source: ANA.

WATER POLLUTION AND PUBLIC HEALTH

The ANA began monitoring Peru's bodies of water in 2009. By the end of 2013, 98 of the 159 hydrographic units were subject to targeted monitoring twice a year. Approximately 41 of the watersheds exceed the established EQS⁴⁰ with respect to parameters like BOD5, COD, suspended solids, lead and other heavy metals,⁴¹ and salinity. More than 10 years of data on water quality is available for the Rimac river, the major source of water supply for Lima. Trends in water quality suggest a decrease in lead concentrations from peaks of 0.1 mg/l before 2008 to levels below 0.065mg/l during 2008–2013. Organic pollutants' concentrations also decreased when compared to pre-2008 levels (MINAM, 2012). The average concentration of total suspended solids went from 428 mg/l in 2002–2007 to 385 mg/l in 2008–2013. Average annual COD levels went from 8.7 to 8.6 mg/l and BOD5 increased from 4.3 to 4.5 mg/l. The maximum permissible limits of BOD5 and COD were exceeded for several years during 2008–2013 (MINAM, 2014b).⁴²

The main pollution sources in Peru's bodies of water come from domestic and municipal wastewater, as well as from improper disposal of solid waste (Figure 24).The Pacific region has the most pollution sources; it is not only

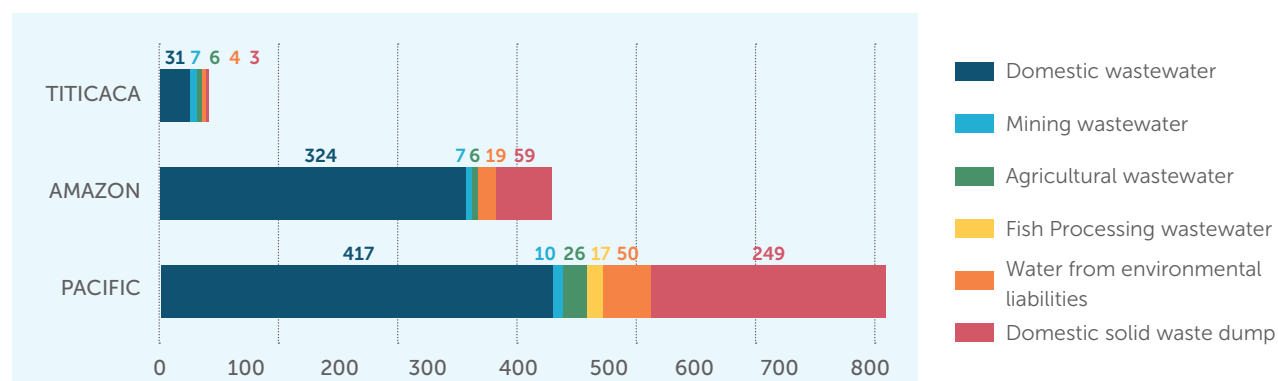
⁴⁰ The diagnosis of the state of water quality in Peru was made in the context of the preparation of the National Hydrologic Plan.

⁴¹ Excessive heavy metal concentrations were found in river basins where mining operations occurred.

⁴² The BOD5 limit of 5.0 mg/l was surpassed in 3 years. The COD limit of 3 mg/l was surpassed in every year of the time period.

FIGURE 24

MAIN SOURCES OF POLLUTION IDENTIFIED BY WATERSHED, 2010–2012 (NUMBER)



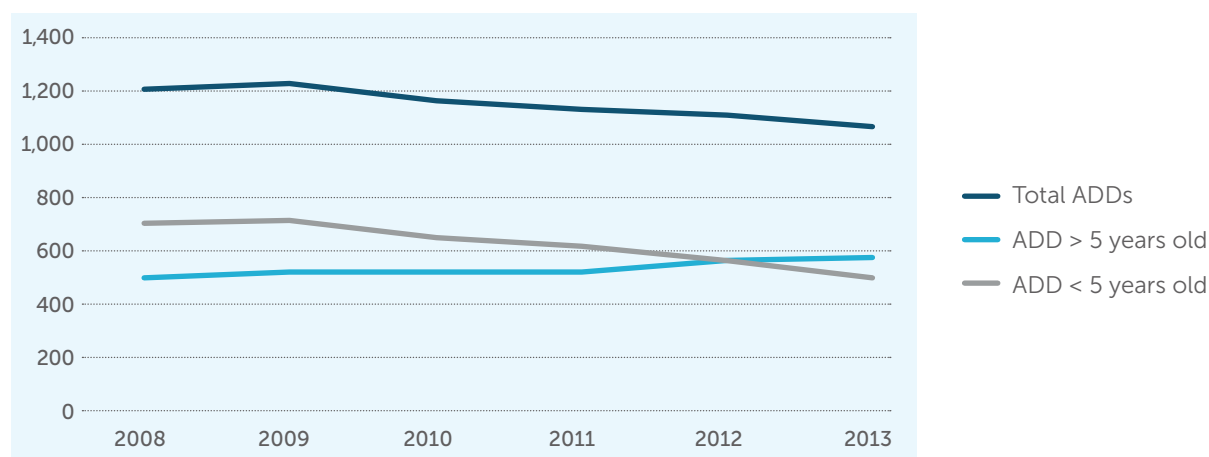
Source: ANA.

home to a large part of the Peruvian population, but it is also a major industrial and agricultural area, as well as one of mining liabilities. The Amazon region is more exposed to mining, mineral extractions and farming. Lastly, the main pressures in the Titicaca region are mining liabilities, farming and livestock-related activities.

Although there are few studies on the direct impact of water's environmental quality on public health, the reviews conducted by the Ministry of Health demonstrate a significant reduction in the number of acute diarrheal disease cases (Figure 25).⁴³ The number of total episodes declined from 1.2

FIGURE 25

NUMBER OF EPISODES OF ACUTE DIARRHEAL DISEASE BY AGE GROUP, 2008–2013 (IN THOUSANDS)



Source: MINSA General Directorate of Epidemiology.

⁴³ There are several factors that can influence the reduction in number of cases, such as access to improved water and sanitation or changes to personal hygiene practices.

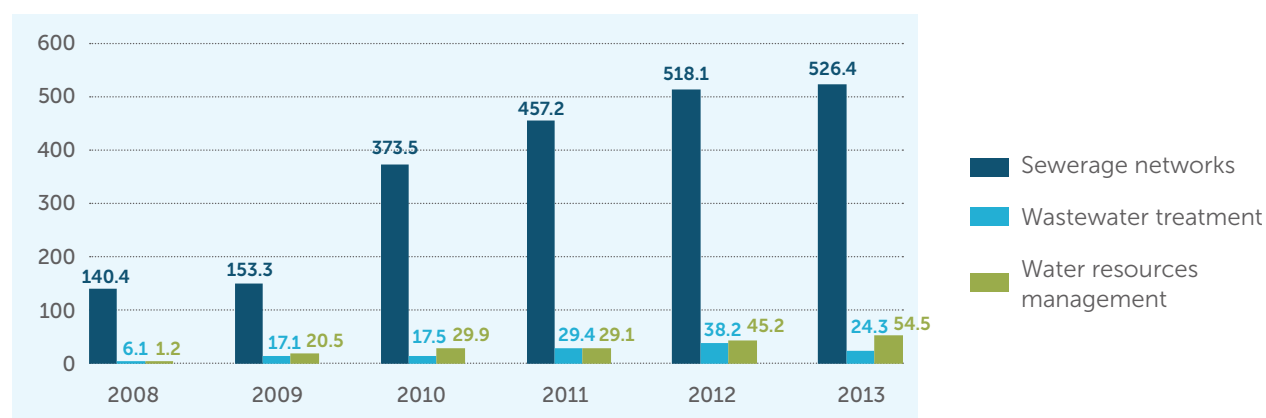
million in 2008 to 1.07 million in 2013. The number of cases was greatest on the coast (50 percent of the total), followed by the mountains (35 percent) and the jungle (15 percent). The number of episodes declined in mountainous and coastal areas, while cases in the jungle have risen in recent years. The number of deaths due to acute diarrheal diseases also declined approximately 40 percent during the period of analysis.

Public Expenditure Evolution

Public expenditure on water resources and wastewater management between 2008 and 2013 rose to US\$2.48 billion. The majority of this expenditure, 87 percent (US\$2.16 billion), was earmarked for sewerage networks.⁴⁴ Investment in this type of infrastructure more than tripled during the period, expanding at a rate of 35 percent annually. The public expenditure on activities related to wastewater treatment accounted for 5 percent (US\$132.6 million), growing at a less dynamic rate of 9 percent annually. Expenditures intended for water resources management amounted to 7 percent of total (US\$180.4 million). The growth in expenditures (34 percent annually) shows the increasing importance of water management in the government's strategic priorities (Figure 26).

FIGURE 26

EVOLUTION OF THE EXPENDITURE ON WATER RESOURCES AND WASTEWATER MANAGEMENT, 2008–2013 (IN US\$ 2102)



Source: Authors' elaboration based on IDB (2014).

⁴⁴ The budgetary information system tends to record sewerage and water supply expenditures together. The percentage of this aggregate expenditure attributable to sewerage networks was analyzed based on the number of added connections and the average cost per connection. It was estimated that 44 percent corresponds to sewerage networks. Therefore, the expenditure included in this report contains an upward bias.

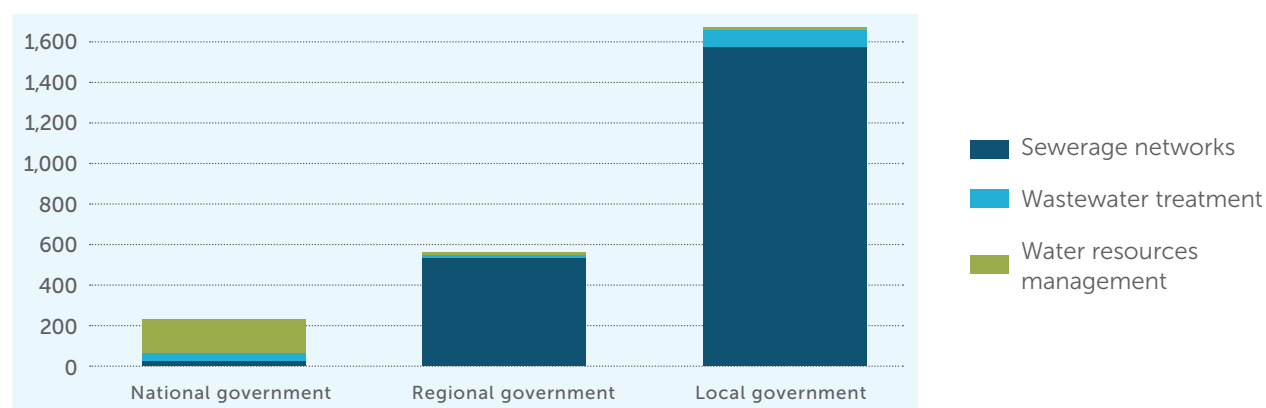
Local governments executed most of the expenditure in investments related to the construction, maintenance, improvement and expansion of sewerage networks.⁴² The total expenditure by local governments was close to US\$1.6 billion between 2008 and 2013. They executed 67 percent of the total resources allocated to sewerage networks and 50 percent (US\$75 million) of wastewater treatment resources in the country.

Regional governments were responsible for 23 percent, or US\$560 million, of total expenditure. The majority of expenditure was on sewerage networks (US\$537 million), representing 25 percent of the total public investment in this activity. Some spending was executed, albeit far less, on wastewater treatment and water resources management.

The national government executed 10 percent of the total expenditure and focused its actions on activities related to water resources management. Within the government, the expenditure is concentrated in three agencies: ANA,⁴³ the water resources governing body, spent US\$176 million, or 90 percent of the total in this category. SUNASS, the environmental sanitation enforcement entity, spent US\$22.3 million (30 percent of the total) on wastewater treatment-related activities. Lastly, the Ministry of Housing spent US\$35 million on sewerage networks (Figure 27).

FIGURE 27

DISTRIBUTION OF WATER RESOURCES EXPENDITURE BY ACTIVITY AND LEVEL OF GOVERNMENT, 2008–2013 AGGREGATE (IN US\$ 2012 MILLIONS)



Source: Authors' elaboration based on IDB (2014).

⁴⁵ In urban areas, service provider companies were one of the main entities to execute local governments' public expenditure. In Peru there are 50 SPs, 48 municipal, 1 under concession, and SEDAPAL, which is administered by the state and funded by FONAFE. SEDAPAL expenditure between 2011 and 2012 rose of US\$289 million, but it was not included in the estimate provided in this chapter. There is no information available on entities that executed part of the local government expenditure in rural areas.

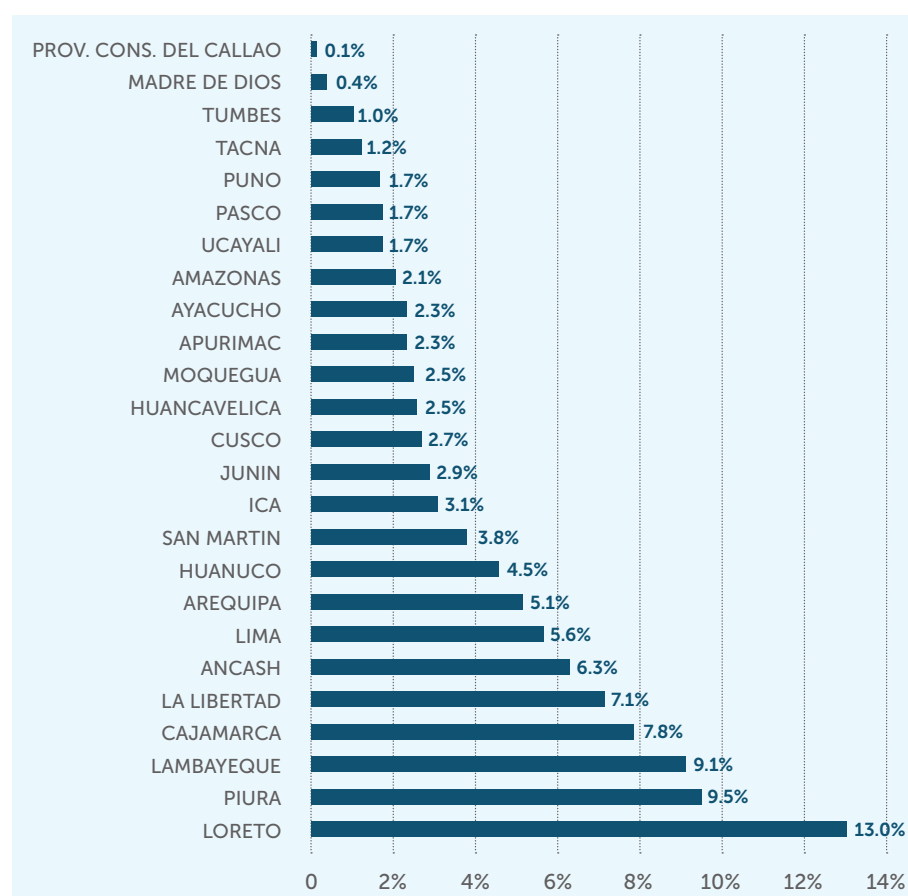
⁴⁶ The make-up of ANA's budget shows that more than 60 percent of the expenditure executed was financed through resources that were collected directly. ANA raises funds by charging for permits to use water and to discharge wastewater. The revenue collected in 2012 totaled approximately US\$22.8 million and was distributed as follows: 64 percent for nonagricultural use, 19 percent for agricultural use, 13 percent for waste water discharge permits.

The geographic distribution of investments in sewerage networks and wastewater treatment reveals that the Department of Loreto executed the largest portion of public funds, or 13 percent of the total. Loreto was followed by Piura, at 9.5 percent; Lambayeque, at 9.1 percent; Cajamarca, at 7.8 percent; La Libertad, at 7.1 percent; and Ancash, at 6.3 percent. On the opposite end of the spectrum, the regions that executed the least funds were Callao, at 0.1 percent; Madre de Dios, at 0.4 percent; Tumbes, at 1 percent; Tacna, at 1.2 percent; and Puno, Pasco and Ucayali, all at 1.7 percent each. Expenditure levels by department are positively correlated with population size (Figure 28).⁴⁷

The average investment per capita in the departments reveals results that differ from the geographical distribution of the gross investment. The

FIGURE 28

EXPENDITURES ON SEWERAGE NETWORKS AND WASTEWATER TREATMENT BY DEPARTMENT, 2008–2013 (IN AGGREGATE PERCENT)

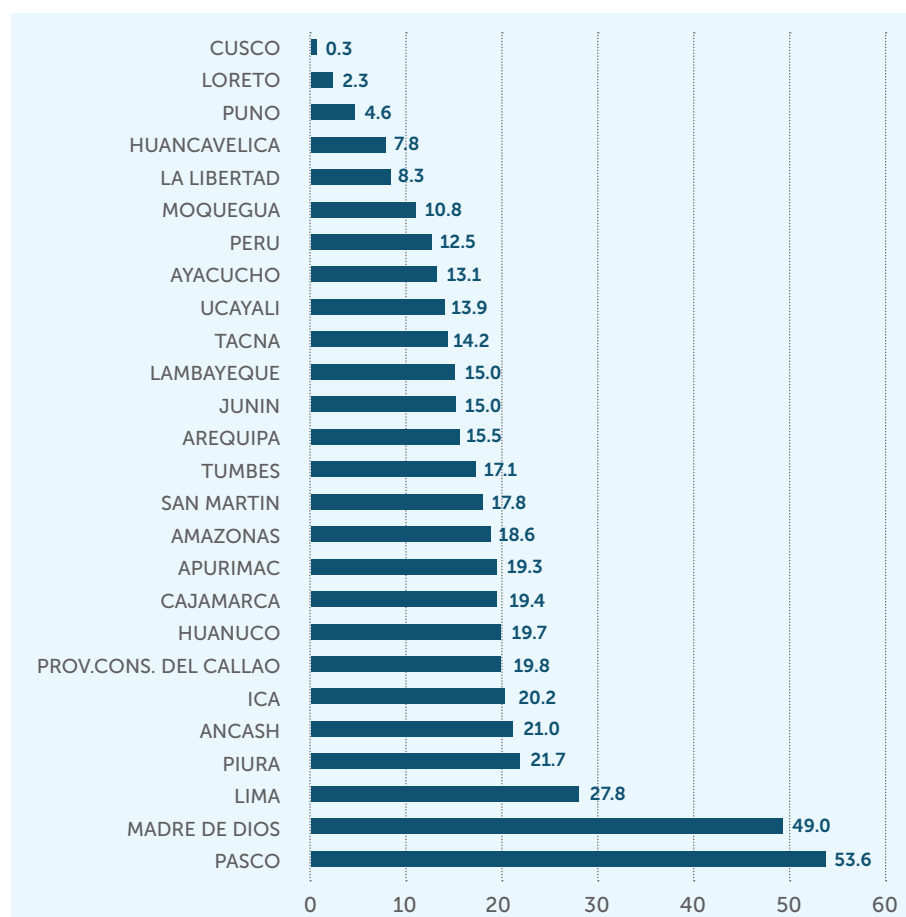


Source: Authors' elaboration based on IDB (2014).

⁴⁷ The correlation between cumulative expenditures during 2008–2013 and urban population is 53.7 percent (excluding Lima from the observations).

FIGURE 29

SEWERAGE NETWORK AND WASTEWATER TREATMENT EXPENDITURES BY DEPARTMENT, PER CAPITA AGGREGATE, 2008–2013



Source: Authors' elaboration based on IDB (2014).

average per capita expenditure on sewerage networks and wastewater treatment at the national level was US\$12.5. The departments with the highest per capita expenditure were Pasco (US\$53), Madre de Dios (US\$49), Lima (US\$27.8), Piura (US\$21.7) and Ancash (US\$21). The departments with the lowest per capita expenditure were Cusco (US\$0.3), Loreto (US\$2.3), Puno (US\$4.6), and Huancavelica (US\$7.8) (Figure 29).

Primary Results

The high level of public investment in sewerage networks has led to an increase in coverage during the period of analysis. The level of coverage has improved substantially among urban populations with access to service providers (SPs), going from 74.9 percent in 2009 to 84.37 percent in 2013.

Nevertheless, coverage among rural populations is 35 percent, reflecting the existing inequality between urban and rural areas.⁴⁸

The percentage of wastewater collected and treated by SPs has progressed at a far slower rate. In 2009, the treatment level was 33.7 percent, reaching 47.7 percent by 2013. This level of treatment refers to urban population with access to SPs. An extended analysis for the entire country suggests that the volume of wastewater that was effectively treated barely hit 25 percent of the country's total wastewater.⁴⁹ ⁵⁰ In addition to existing pressures from domestic sources, water quality in the country is increasingly subject to pressure from pollution originated from the unregulated use of agrochemicals, unpurified industrial effluents, and toxic waste from informal mining.

The increase in treated water volume was the result of better performance on the part of large SPs particularly SEDAPAL, which doubled its purification capacity in 2013.⁵¹ However, the treatment capacity of small and medium-sized SPs has virtually stagnated or decreased. In 2013, the volume of water treated by 20 of the 50 SPs was virtually zero (Table 11).

A comparison of the results obtained with the goals proposed in the National Sanitation Plan 2006–2015 reveals unequal success. While the level of sewerage coverage met the proposed goal of serving 77 percent of the population, the wastewater treatment goal (treating 100 percent of urban waste water) was far from being achieved (only 47.7 percent was treated by the SP in 2013).

The financial sustainability of SP operation improved during the period. SP revenues increased due to: (i) the introduction of tariff rates based on inflation indices and fulfillment of management goals; (ii) an increase in the percentage of active connections; and (iii) a gradual reduction in unbilled water (from 42 percent in 2009 to 36 percent in 2013).⁵² The operating margin reached its peak in 2009 (15 percent) and began to decline until 2013, when it rose again to 8.82 percent.⁵³ An analysis of the margins according to SP size indicates that SEDAPAL is the main and only SP that had a positive operating margin in 2013 (see Figure 30). The small, medium, and large SPs

⁴⁸ The SPs serve 63 percent of the Peruvian population, which is why the sewer coverage level in the country is lower. The MVCS estimated the national sewer coverage level to be 67.3 percent in 2012.

⁴⁹ Assuming an average consumption of 135 l/inhab./day, and using the data of 1,501 Hm³ consumed for domestic purposes in 2013. Domestic wastewater purification reached 379 Hm³ and SEDAPAL and the other SPs collected a total of 795 Hm³ in 2013 according to SUNASS data.

⁵⁰ According to Peru's National Environmental Information System (Sistema Nacional de Información Ambiental, or SINIA), approximately 70 percent of urban waste water goes untreated: <http://sinia.minam.gob.pe/tematicas/agua>.

⁵¹ In 2013, SEDAPAL inaugurated the Taboada Wastewater Treatment Plant, with a capacity to purify water from a population equivalent to 4.5 million inhabitants.

⁵² The average revenue is defined by the following formula: collected revenue/amount billed.

⁵³ The operating margin is defined by the following formula: (operating revenue – operating costs)/operating costs.

TABLE 11

EVOLUTION OF SEWERAGE NETWORK COVERAGE AND VOLUME OF WATER TREATED BY SP SIZE, 2009–2013

	2009	2010	2011	2012	2013
SP sewerage coverage (population served/urban population) (%)	77.1	79.0	80.2	82.72	84.37
Improved access to sanitation (% of total homes) – National Household Survey (ENAH0)	74.6	77.0	77.0	77.4	77.8
Volume of water treated/collected(%) ^a	33.7	32.7	32.7	32.1	47.7
Volume treated (%) by SP size					
SEDAPAL ^b	21.0	20.7	20.65	21.27	51.25
Large SP ^c	57.6	54.3	57.5	53.53	52.96
Medium-sized SP ^d	31.7	33.6	22.8	16.74	23.41
Small SP ^e	25.1	25.4	24.0	27.16	9.26

Source: SUNASS (2014).

^a Collected wastewater that does not receive treatment is discharged again in water bodies.

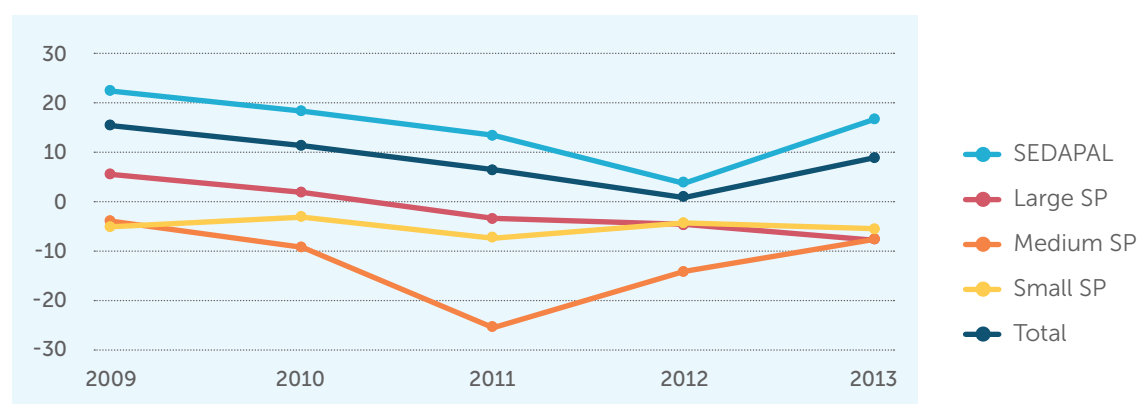
^b Serves more than 1 million people and accounts for 41 percent of the connections.

^c 16 total serving between 40,000 and 1 million people and accounting for 43 percent of the connections.

^d 13 total serving between 15,000 and 40,000 people and accounting for 10 percent of the connections.

^e 20 total serving less than 15,000 people and accounting for 4 percent of the connections.

FIGURE 30

EVOLUTION OF THE OPERATING MARGIN BY SP SIZE, 2009–2013
(IN PERCENTAGE)

Source: SUNASS (2014).

had mostly negative operating margins due to the cost overruns of their management activities and the impossibility of adjusting the rates since they did not achieve satisfactory management results.⁵⁴

The low wastewater treatment level is a result not only of a lack of investment and adequate funds for operation but also the existing overload of domestic wastewater sent to treatment plants. Currently, the wastewater treatment plants (WWTPs) do not have sufficient capacity to treat the level of flow volume and load received. This overload causes the WWTP effluents to exceed the water EQS and MPLs, degrading the environmental quality of water bodies (SUNASS, 2015).

To cope with nondomestic water pollution and reduce the load of wastewater received at WWTPs, the ANA instituted a wastewater discharge permit in 2009. Although there is no precise information, the discharge volume generated by the economic sectors, the ANA issued 589 dumping permits between 2009 and 2013. More than 75 percent correspond to the mining and hydrocarbon sectors, as well as industrial activities related to fish product processing. The distribution by hydrographic region shows that more than 70 percent is concentrated in the Pacific region. While there are data on permit rates and revenue collected there is no information about changes in the volume and characteristics of discharges of regulated companies.

Challenges for Expenditure Effectiveness

The public expenditure on water resources pollution management is the largest environmental expenditure item during the period of analysis. The government has made significant investments in infrastructure to reduce environmental pollution. The country has also boosted its expenditure on water resources governance considerably in order to address existing scarcity and pollution challenges. A number of obstacles still exist to enhancing the effectiveness of this expenditure.

The weaknesses in the ability to monitor water availability, environmental quality, and pollution sources in water bodies limits the successful design, execution and monitoring of programs and activities. Enforcement is also limited by the plethora of institutions involved (e.g., ANA, SERNAMHI, Dirección General de Salud Ambiental [DIGESA], and OEFA).

The expenditure on water resources management is primarily devoted to planning, monitoring, administration and enforcement-related activities.

⁵⁴ A large portion of the SPs were funded through donations or resource transfers and, therefore, there is no need to recover investment cost. However, the rates established are below the level needed to cover operating costs due to an initial miscalculation of operating and maintenance costs (SUNASS, 2015).

The recent establishment of ANA as a governing body has driven these activities. However, the positive impacts of these types of activities will take more time to materialize.

Given Peru's increased water stress, more expenditures will be needed to undertake new investments and absorb greater operating costs for the existing catchment, transportation, distribution, and storage infrastructure so as to ensure the reliability of the water supply. At the same time, investment and measures that will boost the efficiency of water use (irrigation, domestic, etc.) are needed to reduce the pressure on a limited resource.

Water pollution management expenditures have been targeted for expansion of the sewerage network coverage. The environmental performance of these expenditures has been limited due to capacity constraints faced in wastewater treatment. The investment in new treatment plants has grown at a slow pace. Existing treatment plants' performance has been poor, as there are a large number of SPs that cannot cover their operating costs.

In addition to investments in treatment plants, policies were implemented to incorporate "the polluter pays" principle. Attempts to regulate wastewater discharges in water bodies through permits subject to EQS and MPLs have had a limited effect due to a lack of compliance.

4.4 SOLID WASTE MANAGEMENT



Status of Waste Generation

The amount of municipal urban waste generated increased from 5.8 million tons in 2009 to 6.8 million tons in 2013.⁵⁵ In 2013, 73 percent corresponded to household solid waste and the remaining 27 percent to nondomestic waste (MINAM, 2014a). Per capita generation on municipal waste rose from 0.74 kg/inhab./day in 2009 to 0.8 in 2013, below the LAC average of 0.93 kg/inhab./day (IDB, 2011).

At the national level, the per capita household waste generated in 2013 was calculated at 0.56 kg/inhab./day. The values for the coast, mountains, and jungle were 0.588, 0.513 and 0.553 kg/inhab./day, respectively (MINAM, 2014a). Lima generated the most household waste in 2013, with 42 percent (5,684 tons/day) of the nation's total household waste.

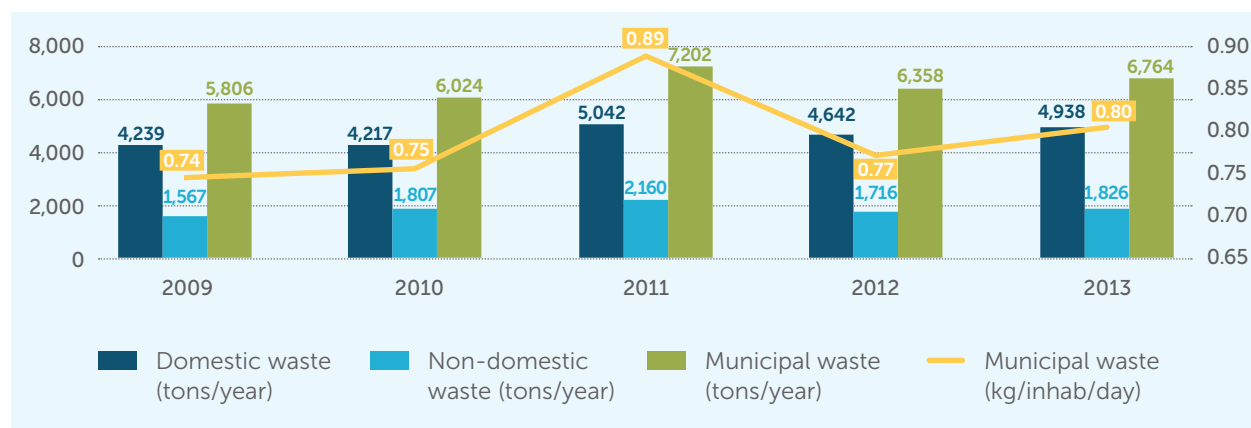
More than 1.03 million tons of non-municipal solid waste generation was reported in 2013 (Table 12).⁵⁶ The subsector with the most waste reported was the manufacturing industry, at 80 percent of the waste generated.

⁵⁵ MINAM estimates are based on a sample of municipalities that report to SIGERSOL. In 2013, 666 municipalities reported to this agency, that is, 36 percent of the nation's total.

⁵⁶ There is an increased variability in company reporting according to the year. In previous years, other subsectors like energy and hydrocarbons reported waste. Additionally, there is a high degree of variability regarding the quantities reported in previous years for subsectors like manufacturing or agriculture. In 2011 they reported 3,000 and 889,000 tons, respectively.

FIGURE 31

MUNICIPAL URBAN SOLID WASTE GENERATION (IN THOUSANDS OF TONS PER YEAR)



Source: MINAM (2014a).

Hazardous waste accounted for 10 percent of the total and nonhazardous 90 percent of the remaining amount. The agriculture subsector generated the most hazardous waste, at 64 percent of the total non-municipal hazardous waste. The health sector reported hazardous or bio-contaminated waste only (MINAM, 2014a).

Lastly, the physical composition of municipal solid waste showed a predominance of organic waste, at 50.43 percent, and materials with a clear potential for recycling at 23.7 percent (plastic, paper, cardboard containers, metal and glass). Non-municipal solid waste was primarily composed of organic material (50.9 percent), plastic (10.1 percent), and hazardous waste (8.5 percent).

TABLE 12

NON-MUNICIPAL SOLID WASTE GENERATION BY SUBSECTOR AND TYPE, 2013

SUBSECTOR	NUMBER OF COMPANIES REPORTING	TOTAL WASTE (THOUSANDS OF TONS/YEAR)	TOTAL NONHAZARDOUS (THOUSANDS OF TONS/YEAR)	TOTAL HAZARDOUS (THOUSANDS OF TONS/YEAR)
Manufacturing	700	823.5	754.9	68.6
Fisheries	253	114.6	113.8	0.8
Agriculture	57	77.6	53.7	23.6
Mining industry	332	11.1	9.6	1.4
Health	548	12.7	0	12.7
Total		1,039.8	932.1	107.6

Source: MINAM (2014a).

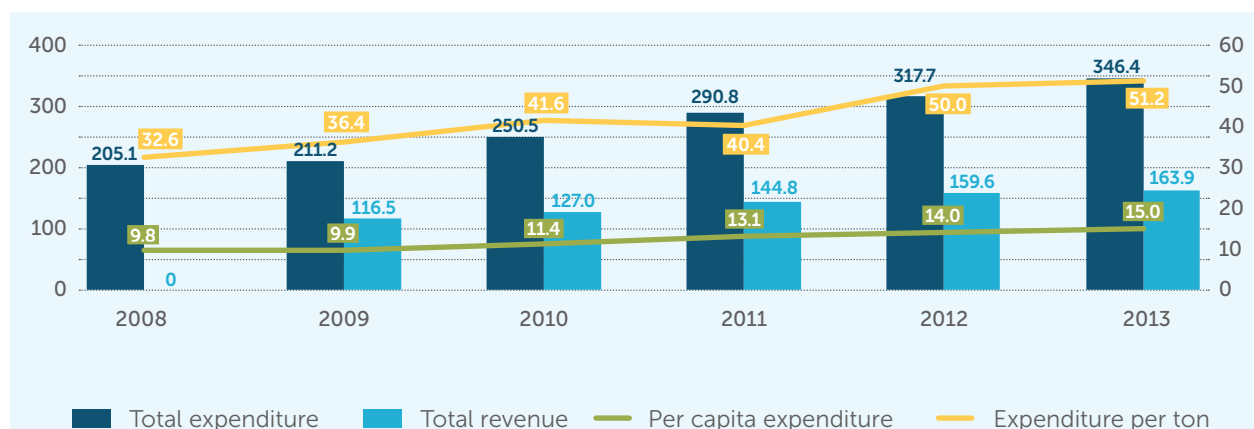
Evolution of Public Expenditure

Public expenditure on solid waste management totaled US\$1.66 billion between 2008 and 2013. Municipal governments,⁵⁷ which spent US\$1.62 billion, executed almost all of the expenditure on solid waste, while national and regional governments spent US\$38.4 million. The average annual expenditure during the period was US\$270 million, with an annual increase of 11.5 percent since 2008. In relative terms, the expenditure has been increasing, eventually reaching US\$15 per inhabitant and US\$51 per ton in 2013.⁵⁸ At the regional level, the expenditure per ton is below the regional average of US\$95 per ton (IDB, 2011).⁵⁹

The main source of funding for waste management has been direct revenue collection and budgeted capital resources,⁶⁰ which financed more than 97 percent of the expenditure during this period. Although total collected revenue grew from US\$116 million to US\$163 million in 2013, its relative weight as a funding source fell from 54 percent to 41 percent of the expenditure. As a consequence, solid waste management services have run operating deficits during this period (Figure 32). Hence, municipalities have had

FIGURE 32

EVOLUTION OF THE SOLID WASTE MANAGEMENT EXPENDITURE RECORDED IN THE GOVERNMENT BUDGET, 2008–2013 (IN US\$ 2012 MILLIONS)



Source: Authors' elaboration based on IDB (2014) and INEI 2015.

⁵⁷ In 2013, 92.7 percent of municipalities provided waste management services directly, 5.9 percent did so in a mixed fashion, and 1.4 percent outsourced this service to solid waste service provider companies.

⁵⁸ Only the country's urban population was taken into account when calculating this statistic.

⁵⁹ This calculation considered municipal (residential and urban) waste generation only, which implies a conservative estimate. The expenditure per ton on residential solid waste reached US\$70 in 2013.

⁶⁰ Resources that were directly collected are composed of contributions from the Municipal Compensation Fund (Fondo de Compensación Municipal, or FONCOMUN) and city taxes. During the period of analysis, their contributions were stable in terms of the percentage of the expenditure financed. In 2013, FONCOMUN funded US\$93.8 million and city taxes US\$67 million of public expenditure.

to seek other sources of funding, such as city taxes or national government funds.

The distribution of expenditures among the various departments between 2008 and 2013 remained consistent in relative terms. More than half of the total expenditure (51 percent) was concentrated in Lima, followed by Provincia del Callao (8.2 percent), Piura (4.9 percent) and Lambayeque (4.7 percent). The remaining departments recorded a cumulative expenditure that represents less than 3 percent of the total. Per capita expenditure levels in 2013 varied greatly. Madre de Dios and Callao have the highest expenditure, with more than US\$30 per capita. Lima and Lambayeque were at US\$19 and US\$17, respectively. The remaining departments fell below the national average, at US\$14.3. The regions with the lowest expenditure were Amazonas (US\$4.7) and San Martín (US\$4.9) (see Table 13). The level of expenditure per ton follows the same pattern as that of the expenditure per capita in 2013. Similar departments are above and below the national average of US\$70 per ton.⁶¹ Lastly, the deficit in revenue collected for solid waste management services reached 47 percent at the national level and varied greatly with respect to the national average. The departments with the greatest population and cumulative expenditure, namely, Lima, Callao and Piura, reported deficits of 34.6 percent, 62.7 percent, and 76 percent, respectively.

⁶¹ Observed differences in expenditure per ton may reflect differences in population density (greater density results in lower cost per ton) and also stem from differences in management efficiency.

TABLE 13

DISTRIBUTION OF THE SOLID WASTE MANAGEMENT EXPENDITURE BY GEOGRAPHIC DEPARTMENT

	CUMULATIVE EXPENDITURE 2008–2013 (PERCENTAGE OF THE TOTAL)	PER CAPITA EXPENDITURE 2013 (US\$)	PER TON EXPENDITURE 2013 (US\$)	REVENUE DEFICIT 2013 (PERCENTAGE)
Amazonas	0.4%	4.7	24.77	72.3
Ancash	1.9%	7.5	37.83	21.8
Apurimac	0.3%	5.1	24.32	87.9
Arequipa	3.4%	10.9	61.13	68.9
Ayacucho	1.1%	6.5	34.46	71.5
Cajamarca	1.6%	8.6	43.97	68.7
Prov. Cons. Callao	8.2%	33.4	139.81	62.7
Cusco	3.0%	15.6	71.21	87.8
Huancavelica	0.5%	9.6	52.78	93.5
Huanuco	1.0%	9.6	52.70	82.1
Ica	3.1%	13.9	72.34	84.6
Junin	2.8%	11.5	62.00	69.0
La Libertad	2.6%	6.5	32.69	29.2
Lambayeque	4.7%	19.4	103.85	72.1
Lima	51.3%	17.2	79.82	34.6
Loreto	2.2%	14.3	70.64	87.3
Madre de Dios	0.5%	30.1	180.33	82.4
Moquecagua	0.5%	6.7	47.43	19.2
Pasco	0.7%	12.2	78.79	92.2
Piura	4.9%	13.4	62.72	76.6
Puno	1.6%	7.8	45.61	79.6
San Martín	0.9%	4.9	24.54	60.2
Tacna	0.9%	6.9	38.41	49.7
Tumbes	0.7%	13.2	79.87	81.8
Ucayali	1.2%	7.3	30.50	55.8
Nacional	—	14.3	70.18	47.3

Source: MINAM (2014a).

Primary Results

The increase in solid waste management expenditures has translated into an improvement in performance indicators during the period of analysis. Performance has been enhanced both in terms of planning-related aspects as well as at the operational level. This section presents a summary of the main achievements.

At the strategic planning level, progress was made on generating information on solid waste for monitoring and decision-making purposes. The number of municipalities that report to the Information System for Solid Waste Management (Sistema de Información para la Gestión de Residuos Sólidos, or SIGERSOL) increased from 246 in 2009 to 666 in 2013. In relative terms, at the end of the period more than 36 percent of Peru's municipalities reported information to the system.

The percentage of municipalities that approved Comprehensive Solid Waste Environmental Management Plans (Planes Integrales de Gestión Ambiental de Residuos Sólidos, or PIGARS), the primary instrument for management planning, grew from 37.9 percent to 76.4 percent by the end of 2013. In addition to the PIGARS, public investment projects were prepared and approved for funding through the National Public Investment System (Sistema Nacional de Inversión Pública, or SNIP). The number of viable projects presented also increased from 77 to 104.

Positive results were also obtained at the operational level, although performance was below the regional average (see Table 14). Service coverage expanded during the period of analysis. Street cleaning coverage went from 74 percent in 2009 to 81.4 percent in 2013. Cleaning personnel increased to 100 per 100,000 inhabitants. Their performance was 1.6 km per cleaner per day. Waste collection coverage reached 86.7 percent, and the number of available trash compactor vehicles rose from 760 to 1,160. Performance improved in terms of appropriate final disposal of municipal waste, even though the level is still low. The percentage of waste disposed in sanitary landfills went from 26 percent in 2009 to 41.3 percent in 2013, falling short of the 50 percent target established in the PLANAA. Although the available sanitary landfill sites increased from 8 to 11 during this period, more than 46 percent of waste is still deposited in garbage dumpsters. Lastly, the percentage of waste collected that was then recycled increased from approximately 2 to 9 percent.

TABLE 14

MAIN RESULTS INDICATORS AT THE PLANNING AND OPERATIONAL LEVELS FOR SOLID WASTE MANAGEMENT, 2009 AND 2013

PLANNING-RELATED ASPECTS			
INDICATOR	2009	2013	LAC AVERAGE 2010
Number of municipalities that report to SIGERSOL ^a (% of the total)	246 (13%)	666 (36%)	—
Municipalities with comprehensive solid waste environmental management plans (%)	37.95%	76.4%	25%
Viable public investment projects	77	104	—
OPERATIONAL ASPECTS			
INDICATOR	2009	2013	LAC AVERAGE 2010
Street cleaning service coverage (%)	74%	81.4%	82.3
Personnel per 100,000 Inhabitants	53	100	—
Sweeping performance (km/sweeper/day)	1.4	1.6	—
Waste collection service coverage (%)	83%	86.7	93.4
Inhabitants serviced per compacting vehicle (number of vehicles)	21,656 (760)	18,638 (1,160)	13,391 (—)
Final disposal in sanitary landfill sites (%) (number of landfills)	26% (8)	41.3 % (11)	54.4%
Final disposal in city dumps (%)	57%	46.2% ⁶³	41.8%
Waste treatment (% municipalities)	4%	15%	—
Waste recycling (% of waste collected)	1.8%	8.9%	—

Source: MINAM (2014a); MINAM (2010); IDB (2011).

^a There are 1,834 municipalities in the country

^b The ratio of waste disposed of in dumps can be disaggregated in controlled dumps (10.6 percent) and open-air dumps (35.6 percent).

Challenges for Expenditure Effectiveness

The solid waste management expenditure level has increased, primarily due to the State's role as a direct service provider. Despite progress made during this period, national performance is still below the regional level. Furthermore, key targets set forth in the government's strategic plans were not met. The primary obstacles to effective expenditure are related to the limited availability of funds for making strategic investments with a greater impact, the shortage of local technical capacity, and a lack of focus on managing waste with a greater polluting potential (hazardous waste).

One of the main barriers to achieving effective solid waste management is the availability of funds for making strategic investments related to waste treatment and final disposal. Currently, the vast majority of the expenditure is devoted to street cleaning, garbage collection, and the operation of existing dumps, many of which do not meet the minimal environmental and sanitary conditions. From an environmental standpoint, a large number of the existing city dumps should be adjusted, and new sanitary landfill sites should be constructed.

The capacity of local governments constitutes an obstacle both for designing viable projects for financing as well as for effectively implementing them. Additionally, municipal solid waste management systems are not financially sustainable, as there is a significant deficit between the revenue collected and the services' operating costs. Municipalities depend, therefore, on collection through city taxes and transfers from the national government to cover this deficit. The limited capacity to raise revenue from the provision of service is also an obstacle to making the necessary additional investments. Spending can also be geared towards the promotion of activities to reduce waste generation, increase recycling and reuse, and involve the private sector and nongovernmental organizations in waste management.

Lastly, the lack of plans, investment in treatment and disposal, and monitoring of hazardous waste can hamper overall waste management results. Allocating more resources to non-municipal solid waste management, namely hazardous waste, can have a greater impact on protecting the environment. The introduction of waste fees varying according to the quantity and toxicity of the waste could be one option for transferring the financial burden to the polluters and generating additional municipal resources.

4.5 BIODIVERSITY PROTECTION



Pressures, Status, and Trends of Biodiversity

Peru is one of the most biologically diverse countries in the world. It has the second largest tropical forest in the region, it is second in the world for variety of birds (1,835 species), the fourth for amphibians (538 species), and the fifth for reptiles (421 species). Peru is also home to almost 20,000 flowering plant species, 1,070 marine water fish species, and 1,011 continental fish species. Moreover, 84 of the 104 life zones on the planet are found in Peru. It has 21 ecoregions, including wet forests, dry forests, desserts, moors, mangroves, savannas and plateaus.

The country's biodiversity is threatened by different pressures that result in land use changes. These changes in land use are caused by different factors: deforestation due to the expansion of the agricultural frontier; infrastructure projects (highways, dams, electrification); real estate and industrial projects; or logging, among other activities (see Table 15). Although there is no official data on the degradation and fragmentation of the ecosystems, species, and genes, there is specific data on deforestation and some assessments of the flora and fauna. Between 2008 and 2013, 813,000 hectares were deforested, at an average annual rate of 135,000 hectares. As opposed to other LAC countries such as Brazil, annual deforestation rate has increased in Peru from 0.1 percent in the period 1990–2005 to 0.2 percent in the

period 2000–2015. The number of wild fauna species critically endangered and endangered rose from 23 and 71, respectively, in 2004, to 64 and 122 in 2014.⁶²

SINANPE has been one of the main instruments used to promote biodiversity protection. SINANPE's coverage went from 15.7 million hectares in 2008 to 17.9 million in 2013, representing a 14 percent increase in covered area. At the end of 2013, there were 77 NPAs administered by SERNANP, which along with the 15 regional conservation areas (covering 2.4 million hectares) administered by regional governments and 69 private conservation areas (covering 253,000 hectares), constitute close to 17 percent of national terrestrial surface.⁶³

TABLE 15

NUMBER OF SPECIES BY CATEGORY OF THREAT, 2004 AND 2014

	CATEGORY	2004	2014
FLORA ^a	Critically endangered	194	—
	Endangered	73	—
	Vulnerable	391	—
FAUNA ^b	Critically endangered	23	64
	Endangered	71	122
	Vulnerable	116	203

Source: MINAM.

^a A total of 777 species were reported in 2004; a survey has not been done since 2014.

^b A total of 301 species were reported in 2004.

⁶² The increase in the number of endangered species between 2004 and 2014 should be interpreted with caution as this increase is also partially due to the increase in additional species discovered and categorized in 2014.

⁶³ Private conservation areas reached 253.5 thousand hectares and regional conservation areas accounted for 2.4 million hectares.

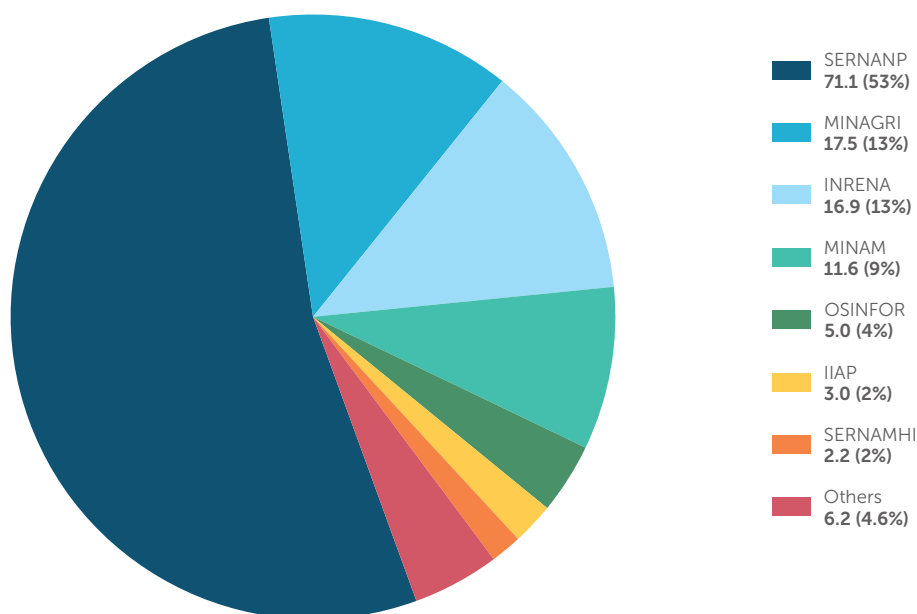
Evolution of Public Expenditure

Public expenditure for activities related to biodiversity protection reached a cumulative total of US\$195 million between 2008 and 2013, rising from US\$26 million in 2008 to US\$195 million in 2013 (Figure 33). The national government has been responsible for nearly 70 percent of the spending (US\$133 million), whereas regional and local governments accounted for 17 percent and 13 percent respectively. At the national government level, more than half of expenditures were made by SERNANP (US\$71 million), SINANPE's governing agency. Agencies such as MINAGRI and MINAM had significant expenditures, with US\$17 and US\$11 million respectively. Other agencies that stand out include OSINFOR (US\$5 million) and IIAP (US\$3 million), as well as INRENA (US\$16 million), which was dissolved at the end of 2008.

The resources exclusively allocated for NPA management within SINANPE rose from US\$15.7 million in 2009 to US\$24.7 million in 2012, representing a 35 percent average nominal annual growth rate for the period (Figure 34). The increase in expenditure was proportionally greater than the expansion in land covered by NPAs, meaning that the expenditure per hectare grew from US\$1 to US\$1.30 by the end of the period.

FIGURE 33

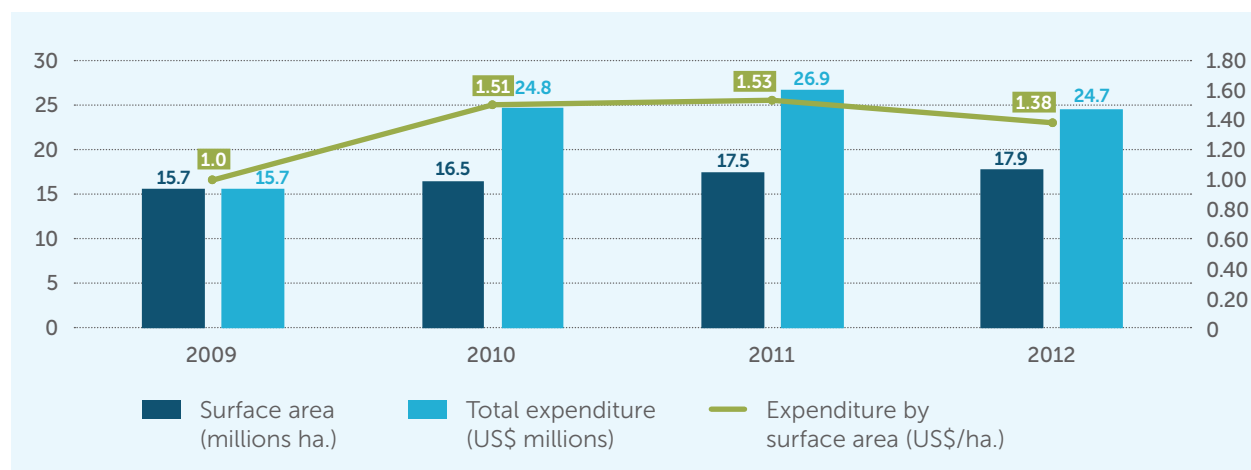
CUMULATIVE EXPENDITURE ON BIODIVERSITY CONSERVATION BY NATIONAL GOVERNMENT AGENCY, 2008–2013 (IN US\$ MILLIONS AND PERCENTAGE)



Source: Authors' elaboration based on IDB (2014).

FIGURE 34

BUDGET AVAILABLE FOR THE PROTECTION AND MANAGEMENT OF SINANPE NPAS (IN US\$/HA)



Source: Authors' elaboration based on SERNANP and PROFONANPE.

There are two agencies responsible for all expenditures on NPA management, SERNANP, the governing body of SINANPE, and the Promotion Fund of Protected Natural Areas of Peru (Fondo de Promoción de las Áreas Protegidas del Estado, or PROFONANPE), a private trust fund earmarked exclusively for the country's NPAs (Figure 35). During the period of analysis, a greater allocation of public funds to SERNANP meant that the proportion of public expenditure exceeded funds from other sources. More than 60 percent of the US\$25 million allocated for the protection of SINANPE in 2012 came from SERNANP (see Figure 35). This 60 percent expenditure share contrast to the 40 percent share of the 2009 budgets (US\$15.7 million). About 73 percent of SERNANP's financing is from ordinary resources, 23 percent from collected resources, and 4 percent from donations. This is a reduction in the historical dependency on donations, although there is still a significant dependency on resources transferred from the government's general budget.

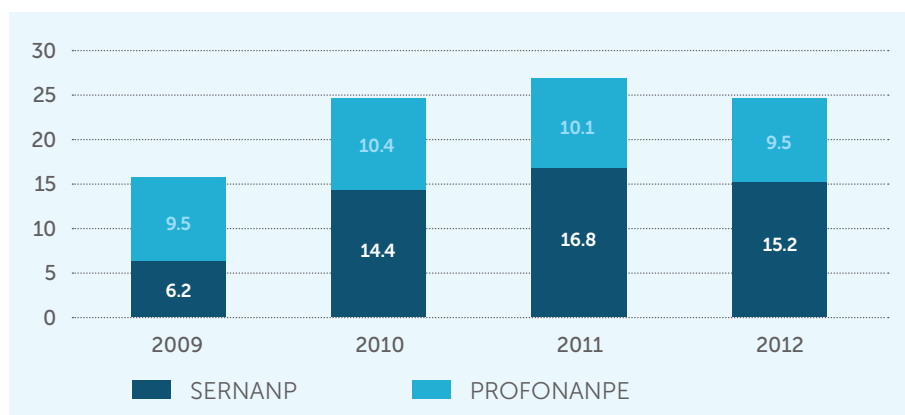
Public expenditure per hectare in Peru is one of the lowest in the LAC region. A financial sustainability study of the protected areas of the region points out that the average investment of US\$1.29 per hectare in Peru is well below the investment levels of countries such as Guatemala (US\$3.35/ha.), Argentina (US\$8.56/ha.), and Costa Rica (US\$16.47/ha.) (UNDP, 2010).⁶⁴

Different studies have attempted to estimate the investment needs for NPA management using different criteria (see Table 16). The UNDP (2010) offers

⁶⁴The values estimated by the study were for annual investment in 2007.

FIGURE 35

BUDGET AVAILABLE FOR NPAS, SERNANP,
AND PROFONANPE, 2009–2012 (IN US\$)



Source: Authors' elaboration based on SERNANP and PROFONANPE.

TABLE 16

FINANCIAL GAP OF NPAS, 2012 (IN US\$ MILLION)

	CRITERIA USED	ADDITIONAL FUNDS (IN US\$ MILLIONS) ^a	PERCENTAGE COVERED BY CURRENT EXPENDITURE
UNDP (2010)	Basic operations	2.2	92 %
	Optimal operations	23.1	49 %
LEÓN (2007)	Environmental conservation services	13.5	65 %

Source: Authors' elaboration based on different sources.

^a Estimated using the US\$24.7 million in expenditure in 2012 as a basis.

a methodology for estimating the additional financial needs that would guarantee the operation of the NPAs at both a basic and optimal level. An estimated US\$2.2 million are needed for basic operations, and an estimated US\$23.1 million would be needed for optimal care of the NPAs in Peru for 2012. Therefore, 92 percent and 49 percent of the needs of each scenario are being covered, respectively. Another study by León (2007), valued the contribution of NPAs to the national economy at US\$1 billion a year, based on the diverse environmental goods and services that they provide to society. This study calculates that 3.5 percent of the value contributed by the ANPs would need to be invested for their conservation. Updating the data to the year 2012, it is estimated that US\$38.2 million would need to be spent on conservation, meaning that US\$13.5 million are needed to close this gap. The present level of expenditure would cover 65 percent of the needs, an intermediate value to that calculated by the United National Development Programme (UNDP, 2010).

Primary Outcomes of the NPA's Management Activities

AVAILABILITY AND DISTRIBUTION OF PERSONNEL FOR SUPERVISION

Field personnel are essential for performing the monitoring and supervising functions of the NPAs. There are currently 576 park rangers in 61 of the 77 publicly managed NPAs, providing coverage to 80 percent of the areas. Personnel availability has improved in comparison to 2003, and on average rangers are now assigned 29,000 hectares per person, compared to 39,000 (Table 17). Nevertheless, the average area is still too large for effective supervision. SERNANP authorities estimate that 216 park rangers are needed to adequately perform their assigned functions.

The allocation of park rangers per NPA also reveals a wide variability in coverage among different areas (Table 18). There are 10 NPAs with more than 50,000 hectares assigned to one park ranger. The most extreme case is the

TABLE 17

PARK RANGER PERSONNEL (PER HA. OF NPA)

PERSONNEL	PARK RANGERS	PER/HA.
2003	280	39,826
2013	576	28,966

Source: Authors' elaboration based on SERNANP.

TABLE 18

DISTRIBUTION OF PARK RANGERS BY SELECTED NPA, 2013

	NUMBER OF PARK RANGERS	SIZE (HA.)	HA./RANGER
COTAHUASI SUBBASIN LANDSCAPE RESERVE	1	490,550	490,550
SIERRA EL DIVISOR RESERVE ZONE	10	1,478,311	147,831
ALTO PURUS NP	21	2,510,694	119,557
PURUS COMMUNAL RESERVE	2	202,033	101,017
AMPAY NATIONAL SANCTUARY	4	3,635	909
CALPUY NATIONAL SANCTUARY	5	4,500	900
CHANCAYBAÑOS RESERVE ZONE	3	2,628	876
BOSQUE DE POMAC H.S.	7	5,887	841
MANGLARES DE TUMBES N.S.	4	2,972	743
LAGUNAS DE MEJIA N.S.	2	690	345
PAMPAS DE AYACUCHO H.S.	2	300	150
PANTANOS DE VILLA	4	263	66

Source: Authors' elaboration based on SERNANP.

Cotahuasi Subbasin Landscape Reserve which has only one ranger for the entire area (490,550 hectares). On the other hand, there are eight NPAs that have less than 1,000 hectares assigned to each park ranger.

TRENDS IN VISITORS AND LEVEL OF REVENUE COLLECTION

A number of the NPAs that possess touristic potential have included this use in their exploitation plans. The register of annual NPA visitors indicates that the number of visitors doubled between 2009 and 2013, surpassing 1.3 million people (see Table 19). Meanwhile, revenue collection has increased from US\$2.3 million in 2009 to US\$3.4 million in 2013. The average revenue collected per person was around US\$2.6. The current fee schedule is being revised for some of the NPAs with the goal of setting different fees for foreign and national visitors to boost revenues. To date, 14 NPAs in Peru charge visitors an entrance fee, 4 of which (Huascarán, Titicaca, Tambopata

TABLE 19

NUMBER OF VISITORS AND COLLECTION AT THE NPAS, 2009–2013

	2009	2010	2011	2012	2013
Visitors	629,808	748,945	1,035,310	1,184,515	1,331,529
Collection (US\$)	2,352,680	2,354,452	2,951,544	3,448,400	3,461,918
Collection per visitor (US\$/person)	3.74	3.14	2.85	2.91	2.60

Source: Authors' elaboration based on SERNANP.

and Paracas) constitute 72 percent of the total visits (2012) and 45 percent of the revenue (2006).⁶¹

STRATEGIC MANAGEMENT INSTRUMENTS

Management plans are good strategic indicators of how well NPAs are managed. In 2009, less than half of the 34 NPAs under public administration had approved management plans. By comparison, more than 50 percent of areas under private administration had management plans, and all of areas run by bi-national entities have their own plan. In 2013, 78 percent of the 77 NPAs had their own management plan.

NPA'S ECOLOGICAL REPRESENTATIVENESS

The NPA's ecological representativeness examines whether the protected areas system contains appropriate samples of the entire gamut of

⁶⁵This does not include Machu Pichu, which is under an independent management system.

biodiversity in the various biological scales and environments (ecosystems and species). In 2013, 21 terrestrial ecoregions were identified. Forty percent of these ecoregions receive more than 10 percent coverage by SINANPE and 60 percent receive less than 10 percent coverage. The ecoregions with less coverage are the wet uplands surrounding Lake Titicaca (0.01 percent), the dry forests of Marañón (0.10 percent), and the dry forests of the central Inter-Andean valleys (0.57 percent) (see Table 20). Fajardo et al. (2014) estimate that approximately 30 percent of country's species are not properly protected by SINANPE.

TABLE 20

PROTECTED AREAS' COVERAGE OF ECOREGIONS, 2014

ECOREGION	TOTAL AREA (IN HECTARES)	PROTECTED AREA (IN HECTARES)	PERCENT OF TOTAL PROTECTED
TOTAL	128,521,561	19,186,195	14.9
Bosques Húmedos de la Amazonia Sur Occidental	23,585,045	7,253,203	30.8
Rio Amazonas y Bosques Inundables	13,795,566	2,076,270	15.1
Yungas Peruanas	13,552,624	3,265,730	24.1
Punas de los Andes Centrales	12,197,198	795,121	6.5
Desierto de Secbura	9,837,898	323,366	3.3
Bosques Húmedos del Ucayali	9,797,225	1,156,760	11.8
Bosques Húmedos del Napo	9,398,930	1,769,803	18.8
Punas Húmedas de los Andes Centrales	7,665,896	704,019	9.2
Bosques Húmedos de los Solimoes – Japurá	5,541,686	857,620	15.5
Andes Centrales	5,482,306	167,427	3.1
Bosques Secos de Piura y Tumbes	4,518,240	265,195	5.9
Bosques Secos del Centro y Valles Interandinos	2,729,687	7,923	0.3
Bosques Secos del Marañón	2,276,145	2,184	0.1
Punas Húmedas del Titicaca	2,110,212	18,328	0.9
Bosques Montanos Occidentales de los Andes del Norte	1,999,846	65,617	3.3
Bosques Montanos de la Cordillera Real Oriental	1,385,616	69,756	5.0
Páramos	1,144,303	93,638	8.2
Yungas Bolivianas	958,142	237,018	24.7
Lago Titicaca	516,225	35,944	7.0
Sabanas del Beni	18,300	18,300	100.0
Manglares de Tumbes - Golfo de Guayaquil	10,471	2,971	28.4

Source: Environmental Statistics Yearbook 2015, INEI.

IMPACTS OF ACTIVITIES IN ANP

At the end of 2013, 94.73 percent of the NPAs under national management did not show any negative effects resulting from activities inside the areas. Using methodologies for measuring effects by activity within an NPA, the likelihood of a negative effect due to an activity declined from 5.81 percent in 2011 to 5.27 percent in 2013. During this same year, the most likely effects in public NPAs were overuse of resources (3.56 percent), pollution effects (3.03 percent), loss of habitats (2.98 percent), and the displacement of native species by exotic ones (1.36 percent) (MINAM, 2014b).

Challenges for Expenditure Effectiveness

Public funds earmarked for protecting biodiversity in Peru increased significantly during the period of analysis. However, there are still a number of challenges to effective and efficient protection, namely the protected areas system design, lack of funding needed to guarantee the NPA's operational sustainability, and need to place more value on biodiversity's contributions to the economy.

At the strategic level, SINANPE's current design offers a limited degree of ecological representativeness of the country's natural wealth, which thereby dilutes any effort to conserve biological diversity. At the same time, the NPAs are not necessarily located in areas with the greatest pressures on biodiversity, which diminishes the effectiveness of related spending.

The resources available for NPA management also inhibit protected areas' ability to function properly. Budgetary restrictions highlight the need to focus spending on NPAs that have a greater impact on biodiversity protection. Currently, the budget allocation criterion is closely tied to surface area. By determining allocation according to criteria such as an area's level of endangerment or its potential touristic appeal better results could be achieved.

Showcasing the various uses of the NPAs is one possible strategy that would effectively raise internal resources, making it possible to cover gaps in the funding needed to manage the SINANPE. Placing value on the areas' touristic appeal, combined with an entrance fee schedule that factors in the willingness of certain types of visitors to pay can increase collection at

the NPAs. Similarly, introducing a fee schedule for environmental services can also generate some additional revenue for NPAs that contain water recharge areas or which can sequester carbon.

It will also be important to leverage public efforts with the involvement of other public and private stakeholders in the biodiversity protection arena. Some examples of possible strategies include agreements with local and regional governments, co-management arrangements, and institutional frameworks for promoting investment, such as PROFONANPE.

4.6 FOREST RESOURCES MANAGEMENT



Forest Resources Status

The percentage of surface area covered by forests in 2012 was 52.9 percent, that is, 70 million ha. While the forest cover is above average for nations in the region (46.9 percent), Peru's forestry resources do not constitute a direct contribution to the domestic economy,⁶⁶ having also suffered from deforestation. The main sources of pressure that affect forest conservation are related to activities such as agricultural and livestock farming, highway expansion, and illegal timber harvesting (MINAM, 2014b).

Between 2008 and 2013, 813,000 ha. were deforested in Peru. The average annual rate was 135,000 hectares, representing a 36 percent increase from the 99,000 hectares average during the 2003–2008 period. The country's departments with the greatest cumulative loss of forest during this period were San Martín and Loreto (165,000 ha. each), Ucayali (146,000 ha.), Huánuco (119,000 ha.) and Madre de Dios (65,000 ha.). The Amazon region suffered the greatest impact of deforestation, which occurred primarily in forests that are not officially categorized as such (MINAM, 2014b).

⁶⁶ According to the National Reforestation Plan developed by the Ministry of Agriculture-National Institute of Natural Resources (MINAG-INRENA) in 2005, it is estimated that exports from natural forests in Peru bring in US\$1.1 US\$/ha. The global average is US\$20/ha, and in countries such as Chile or Brazil, it hovers around US\$1,000/ha.

Evolution of Public Expenditure

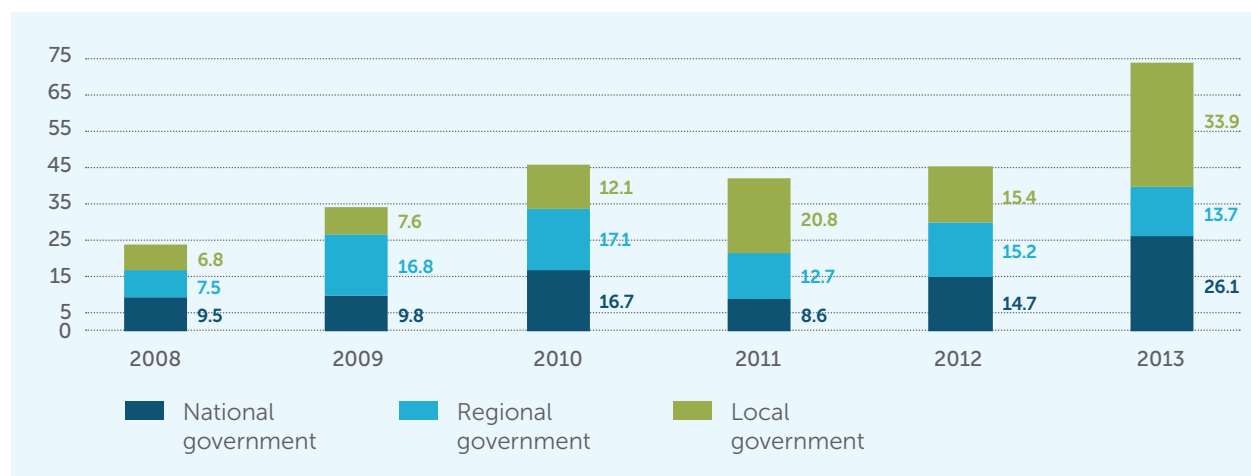
Public spending on forest resources management between 2008 and 2013⁶⁷ reached a cumulative total of US\$265 million. Expenditures grew at a 35 percent annual rate, increasing from US\$23.8 million to US\$73.7 million in 2013. All three levels of government bore a similar share of the total expenditure. Local governments spent 36 percent of the total (US\$96 million), while regional governments spent 31 percent (US\$82 million). The national government spent US\$85 million (32 percent of the total), primarily via the MINAGRI (US\$68.74 million), OSINFOR (US\$10.9 million) and MINAM (US\$3.37 million) (Figure 36).

Seventy percent of expenditures were capital expenditures, mostly for the purchase of nonfinancial assets. Sources of funding were ordinary and budgeted capital resources (75 percent), directed collected resources (16 percent), and credit operations and donations (9 percent).

Between 2008 and 2013, the majority of the expenditure (66 percent, or US\$174.5 million) was devoted to reforestation-related activities. The rest was earmarked for management-related activities associated with regulation, monitoring, enforcement, fire management, and other unidentified areas.

FIGURE 36

PUBLIC EXPENDITURE ON FOREST RESOURCES MANAGEMENT, 2008–2013



Source: Authors' elaboration based on IDB (2014).

⁶⁷ Any funds used for conservation purposes are included in the estimation of forest resources management public spending, while production-oriented expenditures are excluded.

Main Outcomes of Reforestation Activities

Between 2008 and 2012, reforestation-related activities accounted for a high percentage of public spending.⁶⁸ Most of the reforestation analyzed involves planting trees to increase water recharge in watersheds and protect against flooding. During this time, 153,000 hectares were reforested in Peru, an average of 30,700 hectares annually. The total number of hectares reforested falls far below the estimated potential of suitable reforestation land (9.5 million ha. In 2010) and the total number of hectares deforested (666,000).

The departments with the largest amount of land reforested were Cajamarca, Ancash, La Libertad, Cusco, Ayacucho, Apurímac and Huancavelica. When comparing reforestation with the cumulative deforestation by department, a number of aspects stand out. In some cases, land is reforested at the same rate that it is deforested (Puno, Cusco). In the vast majority of cases, there is no reforestation in the departments that are most highly deforested, such as San Martín, Ucayali, Loreto, and Huánuco, which are all in the Amazon region (Figure 37).

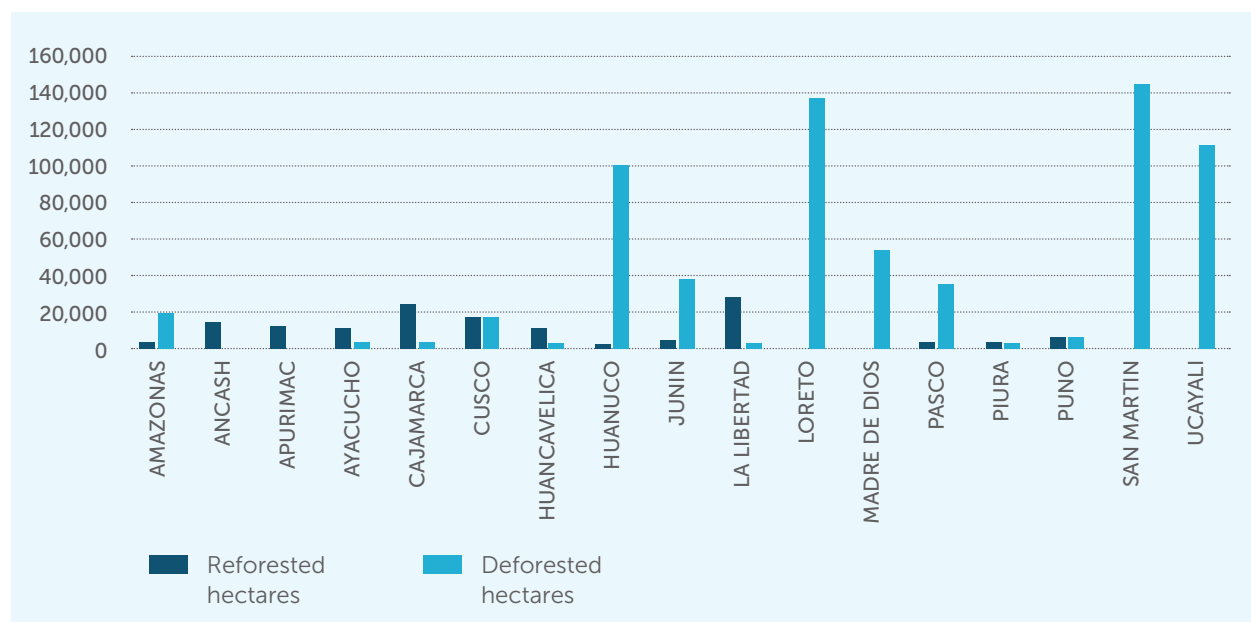
Reforestation efforts and their effectiveness have varied between 2008 and 2012. The average cost per hectare of forest planted during this period is US\$778, which lies within the estimated costs of reforestation contained in the 2005 National Reforestation Plan (see Figure 38). However, significant variability of the annual reforestation cost per hectare is observed at the department level. Cost has fluctuated from US\$1,367 to US\$488 per hectare. This variation can possibly be explained by differences in species type, land types or even implementation efficiency.

Regional analyses in Peru reveal varying levels of cost-effectiveness of reforestation activities between 2008 and 2012. Based on a sample of the departments located on the coast, the average reforestation cost was US\$1,211 per hectare, ranging from US\$263 in Lambayeque to US\$1,846 in Ancash. In the highlands, the average reforestation cost was US\$1,032 per hectare, ranging from US\$311 in Puno to US\$1,686 in Huancavelica. Lastly, in the jungle, the average cost of reforestation was US\$1,572 per hectare (Table 21).

⁶⁸ No additional spending associated with reforestation management costs was included in the reforestation items.

FIGURE 37

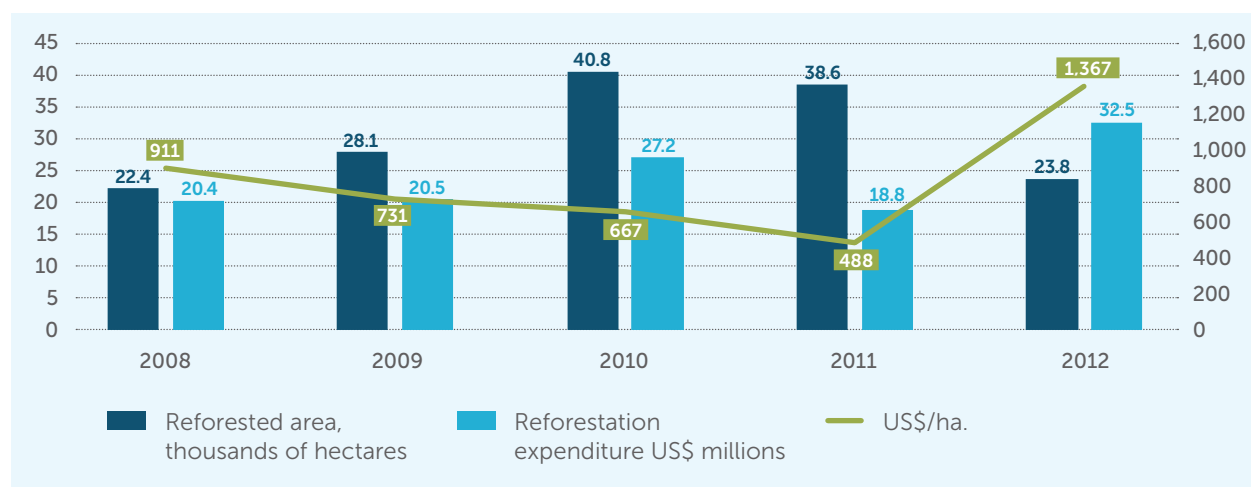
REFORESTATION AND DEFORESTATION TRENDS BY DEPARTMENT, 2008–2012 (IN HECTARES)



Source: Authors' elaboration based on National Forest and Wildlife Service (SERFOR).

FIGURE 38

EXPENDITURES AND REFORESTED AREA, 2008–2012 (IN US\$ 2012 MILLIONS AND HECTARES)



Source: Authors' elaboration based on IDB (2014) and SERFOR.

TABLE 21

AVERAGE COST OF REFORESTATION BY DEPARTMENT, 2008–2012

DEPARTMENT	TOTAL EXPENDITURE (US\$ MILLIONS)	REFORESTED HECTARES	EXPENDITURE BY REFORESTED AREA (US\$/HA.)
COAST			
Ancash	27.1	14,657	1,846.3
Arequipa	0.8	1,948	427.8
Lambayeque	0.6	2,354	263.6
Lima	2.2	3,707	597.0
Moquegua	0.5	568	948.8
Piura	1.9	4,172	460.6
Total	33.19	27,406	1,211
HIGHLANDS			
Apurimac	6.5	12,390	525.1
Ayacucho	11.7	10,772	1,090.3
Cajamarca	15.5	24,804	626.0
Cusco	29.4	17,563	1,675.3
Huancavelica	17.7	10,479	1,686.4
Pasco	6.6	4,147	1,585.8
Puno	2.0	6,513	311.5
Total	89.5	86,668	1,032.4
JUNGLE			
Amazonas	6.3	3,987	1,572.1

Source: Authors' elaboration based on IDB (2014) and SERFOR.

Challenges for Expenditure Effectiveness

A large part of spending on forest resources management has been concentrated on reforestation. The results fall short from the objectives proposed in the National Reforestation Plan.⁶⁹ The reasons behind these poor results include limited public resources availability than initially anticipated and a wide variation in effectiveness on reforestation-related activities among Peru's different departments.

In order to leverage public reforestation efforts, private investment must be promoted while creating an appropriate regulatory framework and

⁶⁹The plan contemplated forestry plantations aimed at protecting the environment and managing watersheds: the estimated reforestation potential was 13.5 million ha.; the reforestation target was 909,500 ha. by 2024, at a cost of US\$688 million, that is, US\$756/ha. (with cost varying by coast, mountains and jungle areas). The team developed an estimate for PRODUCE's spending on fisheries administration and enforcement. Certain operational expenditures were not included as it was not possible to differentiate them in the budgetary information system.

strengthening regulatory instruments such as zoning land suitable for forests. There are other instruments for enhancing private sector involvement, such as payment for environmental services, credits or fiscal incentive systems, which have the potential for making spending more effective.

At the strategic level, scarce investment in public goods like monitoring and enforcement systems, plant health, forest extension services and fire management limits the effectiveness of spending insofar as the objective of forest conservation in the country is concerned. Furthermore, additional measures to control deforestation such as land titling and land zoning, forest harvesting permits, and forest monitoring systems can prevent illegal deforestation and land use changes. Given the current deforestation dynamics, it is possible that redirecting expenditures toward deforestation control and prevention could help better conserve forest areas.

4.7 FISHERIES RESOURCES MANAGEMENT



The Importance of Fisheries Resources in Peru

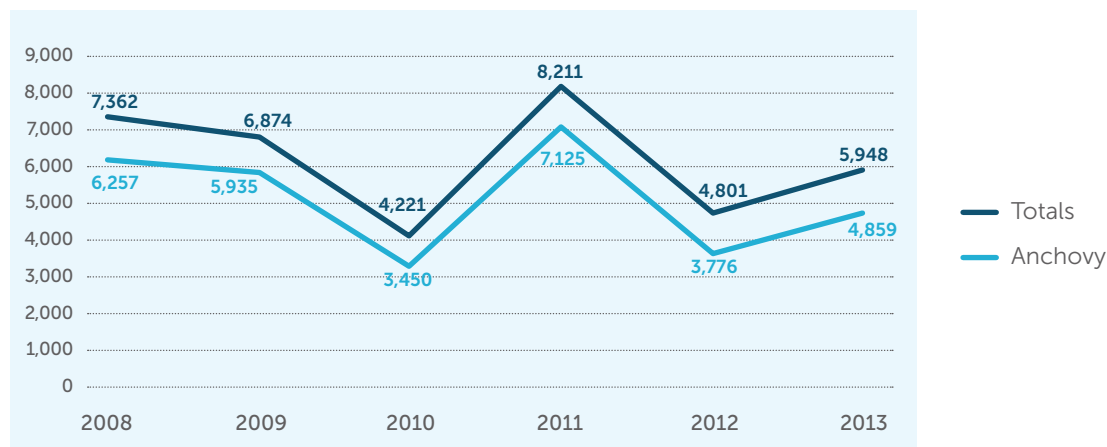
Fisheries activity represents more than 1 percent of the GDP of Peru, generating direct and indirect employment for more than 120,000 people. Its exports totaled US\$3.328 billion in 2012, 9.7 percent of the total country export value. During the period of analysis, fisheries resources landings decreased from 7.3 million tons to 5.9 million tons (see Figure 39). The fluctuations in landings are largely dictated by anchovy trends, the largest single stock fishery in the world. Natural variability in ocean conditions has produced extreme fisheries resources volatility over the years. The combination of natural variability and overcapacity in existing harvesting and processing has resulted in the overexploitation of resources.

Fisheries Resources Status

Peru's fisheries resources have been subject to great stress due to the sector's overcapacity and weak governance systems. The number of species whose stocks collapsed or were overfished at the biological level went from 34 percent in 2008 to 53 percent in 2013 (Figure 40) (Pauly and

FIGURE 39

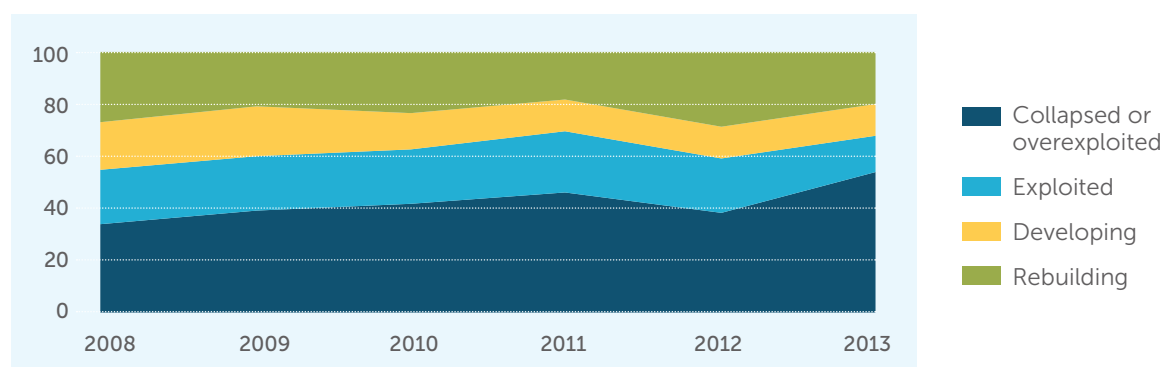
TRENDS IN FISHERIES RESOURCES LANDINGS, 2008–2012 (IN METRIC TONS)



Source: PRODUCE (2013).

FIGURE 40

PERCENTAGE OF STOCKS OF A GIVEN STATUS IN THE EEZ, 2008–2013

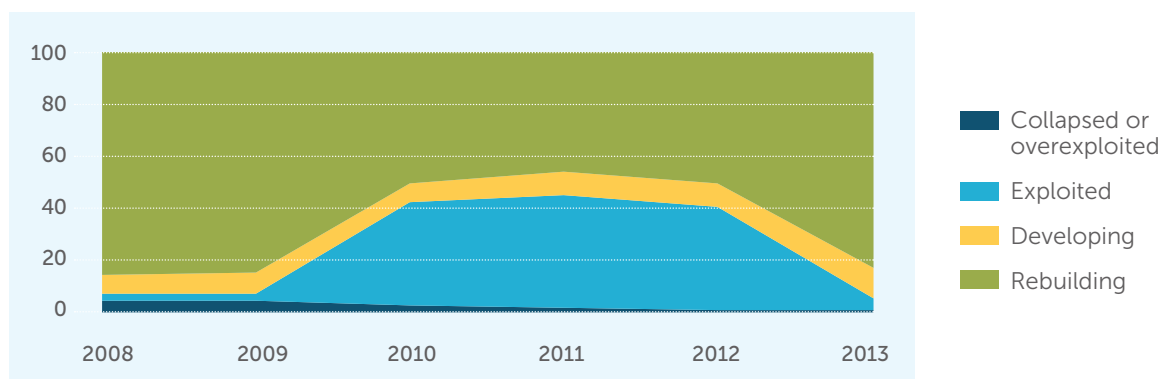


Source: <http://www.seaaroundus.org/data/#/eez/604/stock-status>.

Zeller, 2015). The percentage of catches originating from overfished or collapsed fisheries decreased during the same period (Figure 41). The majority of catches originate from rebuilding fisheries, which include anchovy. Landings anchovy, the fishery with the highest volume exploited within the country's economic-ecological zoning (EEZ), peaked in the 1970s. Since then, anchovy biomass has declined over time and has been subject to drastic fluctuations during El Niño years.

FIGURE 41

PERCENTAGE OF CATCHES FROM STOCKS OF A GIVEN STATUS IN THE EEZ



Source: <http://www.seaaroundus.org/data/#/eez/604/stock-status>.

Public Expenditure Assessment

Public expenditure in fisheries resources management includes activities that promote sustainability of the resource, such as research, administration, and enforcement. The estimation herein excludes expenditures directly related to production, such as those earmarked for providing infrastructure or those made to boost post-harvest activities. The expenditures included are those intended for the following:

- Research aimed at informing decision makers regarding fisheries resources management (e.g., data collection, censuses, analyses, and stock evaluations)
- Creating, implementing, and administering management systems (e.g., regulations, quotas, licenses, and permits)
- Applying fisheries rules and regulations (e.g., coastal and maritime surveillance, inspections, fleet tracking)

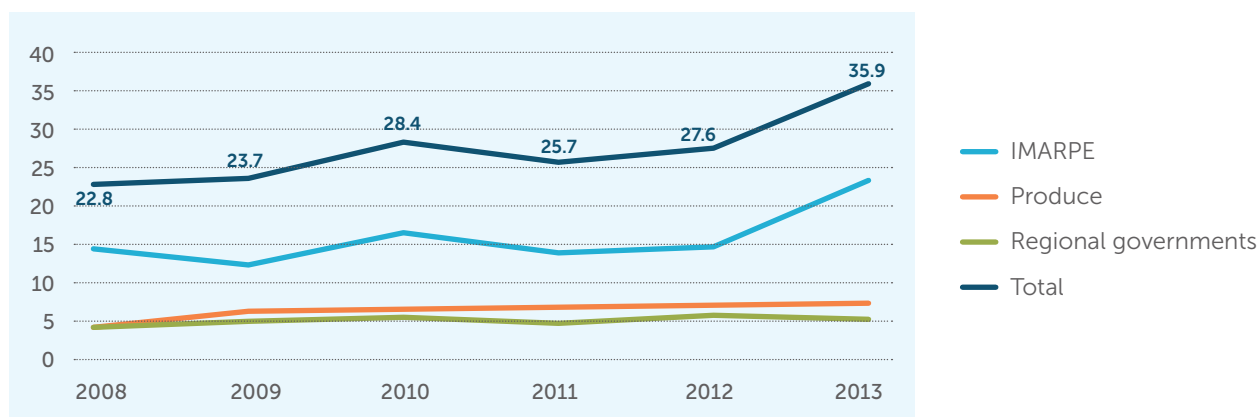
According to the definition above, spending on fisheries management in real terms increased from US\$22.8 million in 2008 to US\$35.9 million in 2013, with an annual growth rate of 9.5 percent. In 2013, IMARPE spent US\$23.4 million, PRODUCE US\$7.5 million, and regional governments US\$5.1 million (Figure 42).⁷⁰

Total expenditures on fisheries resources management as a percentage of the value of fisheries product exports was relatively stagnant between 2008

⁷⁰ The team developed an estimate for PRODUCE's spending on fisheries administration and enforcement. Certain operational expenditures by the vice minister of fisheries were not included as it was not possible to differentiate them in the budgetary information system.

FIGURE 42

TRENDS IN FISHERIES RESOURCE MANAGEMENT EXPENDITURES BY INSTITUTION, 2008–2013 (IN US\$ MILLION)

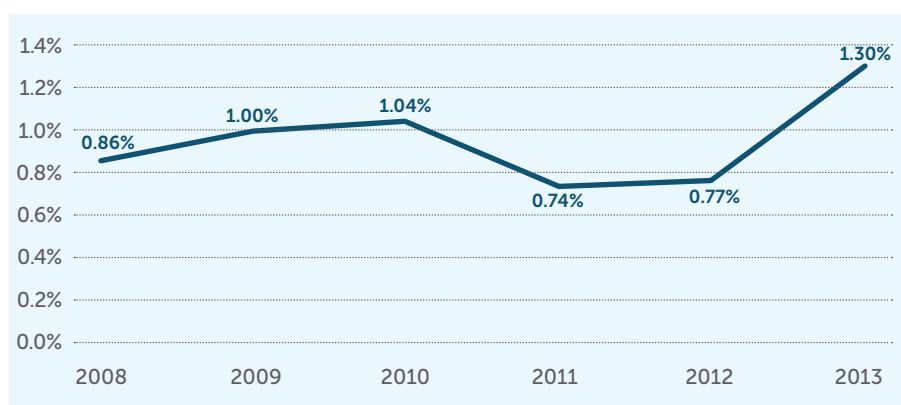


Source: Authors' elaboration based on IDB (2014).

and 2013, with a slight increase from 0.9 to 1.3 percent (Figure 43). While expenditures increased at an annual rate of 9 percent, the value of fisheries product exports varied greatly, starting at US\$2.647 billion in 2008, peaking at US\$3.352 billion in 2012, and then falling to US\$2.769 billion in 2013.

FIGURE 43

FISHERIES RESOURCE MANAGEMENT EXPENDITURE AS A SHARE OF CATCH FOB (IN PERCENT)



Source: Authors' elaboration based on IDB (2014) and PRODUCE annual statistics for 2011 and 2012.

Note: FOB = free on board.

The distribution of fisheries resources spending according to each resource management function is appropriate in principle, but the total amount invested is insufficient (Table 22). When compared with other Organisation of Economic Co-operation and Development (OECD) countries, Peru's investment in fisheries resource management with respect to production

TABLE 22

PUBLIC EXPENDITURE ACCORDING TO FUNCTION IN THE FISHERIES SECTOR

	EXPENDITURE (% OF CATCH VALUE)	RESEARCH	ENFORCEMENT	ADMINISTRATION
Perú (2) ^a	0.8% (2)	52%	38%	10%
Chile (2)	1%	7%	46%	47%
OCDE (3)	10%	30%	40%	30%

Fuente: Base de Datos AGPA 2008-2012, Salgado Cabrera y Quiroga Suazo, 2012.

(2) 2012; (3) 1999; (4) % valor X FOB del año.

^a To estimate the percentages in Peru, the following classification was made: IMARPE spending was allocated to research and PRODUCE spending was allocated to enforcement and administration based on the percentage of the budgets for the General Office of Oversight, Monitoring, and Control and the General Office of Fishery Extraction and Processing. These quantifications possibly underestimate expenses associated with auditing and management due to the registration procedures of the budgetary information system. Additionally, DICAPI collaborates with PRODUCE on fishery enforcement, but it was not possible to estimate the percentage of said institution's spending that is earmarked for this purpose.

value is rather meager, lingering at 0.8 percent versus the 10 percent OECD average. Based on the distribution of spending according to management function in Peru, 52 percent of the total is assigned to research, 38 percent to enforcement, and 10 percent to administration; these proportions are comparable to other OECD countries.

Table 23 provides an international comparison of the spending level in relation to key fisheries management indicators. The total fisheries management expenditure as it relates to the production value in Peru is low when compared to other countries with a fishing tradition. Peru's expenditure was US\$3 per ton, which is low when compared to US\$41 in Argentina and US\$71 in Japan. Expenditure is also low relative to production value (0.8 percent) when compared to Japan (2.9 percent) and Argentina (4.7 percent), and the United States (17 percent). Spending level with respect to the

TABLE 23

COMPARISON OF THE REGIONAL EXPENDITURE IN RELATION TO FISHERIES RESOURCE MANAGEMENT INDICATORS

	EEZ SIZE (US\$/KM2)	COASTLINE (US\$/KM2)	PRODUCTION VALUE (US\$/TON)	PRODUCTION VALUE (IN %)	NUMBER OF EMPLOYEES (US\$ PER EMPLOYEE)	FLEET SIZE (US\$/FLEET)
Peru (2012)	28.4	8,358	3.11	0.8% ^a	295	3,600
Argentina (2012)	26.3	6,038	41	4.70%	3,177	ND
Australia	10.4	1,562	448.7	8.50%	5,446	6,898
EU	ND	6,789	16.28	3.30%	4,856	13,862
Japan	103	13,399	71.81	2.90%	1,727	2,169
United States	53.20	30,792	138.6	17%	ND	20,405

Source: IDB (2014); OECD (2003).

Notes: Data from 2001, unless otherwise noted; ND = no data available.

^a value of exports FOB.

size of the EEZ and coastline reveals mixed conclusions. Peru is at a similar level as Argentina, although it falls short of other countries such as Japan and the United States. Lastly, spending in Peru lags behind that of other countries in relation to the size of the industry measured according to the number of employees and fleet size.

Challenges for Expenditure Effectiveness

Public spending on fisheries management in Peru is relatively low with respect to its production value and international standards. Increasing available public funds is possible by increasing the share of revenue collected from the private sector that benefits from fisheries resource exploitation. The actual public revenue collected from fisheries rights is slightly lower than in other resource extraction sectors. For example, the State collected US\$27.8 million from such rights in 2011. This revenue represented 0.8 percent of the export value, while this ratio was 1.2 percent in the mining sector (Paredes, 2013). The fisheries rights fees are set according to anchovy's fishmeal value (0.25 percent FOB TM value) and at 0.058 percent tax units/TM for other species. These rates do not factor in related administrative costs.

Fisheries management policies were introduced during the period of analysis. A policy of an individual vessel quota system was adopted in the anchovy fisheries in 2008. This policy encouraged sector consolidation resulting in a reduction of fleet. Variable operating profit as a share of landing prices also increased from 41 percent to 65 percent (Kroetz et al., 2016). However, this quota system generated incentives to underreport catches, thereby placing its effectiveness at risk. Increased oversight and enforcement efforts must be ramped up to guarantee a proper function of the system. Any increase in spending on enforcement must be accompanied by the establishment of a monitoring system for the main result indicators, such as degree of industry compliance with the regulations.

In addition to increasing its enforcement efforts, Peru must update its fisheries research capacities to generate relevant information on the status of fisheries biomass and its sustainability. This information is critical when designing effective fisheries management policies.

/5/ Conclusions and Policy Recommendations



5. CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 CONCLUSIONS

Peru experienced above-average economic growth compared to other countries in the LAC region between 2005 and 2013. This process of development has led to widespread pressure on the environment. Peru took major steps to strengthen its environmental institutional framework to align economic growth with environmental protection and sustainable use of natural resources. These reforms and the establishment of new institutions have been accompanied by an increase in the allocation of public resources for environmental management.

Between 2008 and 2013, public environmental expenditure increased from US\$510.7 million to US\$1.29 billion. A greater level of expenditure was also observed in relative terms as it went from US\$17 per capita to US\$42.5 during this period. Environmental expenditure accounted for 1.9 percent of public expenditure and 0.36 percent of the GDP in 2008, and it reached 3.1 percent and 0.6 percent, respectively, in 2013. While the expenditure level in relative terms is below that of OECD countries, at the regional level Peru is ahead of other LAC countries such as Bolivia, Guatemala, and Paraguay.

Throughout the period of analysis, regional and local governments executed more than 80 percent of the expenditure, which consisted primarily of spending on sewerage networks, solid waste management, and reforestation. The national government executed 11 percent of the expenditure in activities related to regulatory, planning, reporting, monitoring, and enforcement activities.

The source of the environmental expenditure funds reveals an increase the ability to generate funds directly (at 20 percent of the total) through fees for the use of natural resources and environmental permits. Specific central budget resources financed 40 percent of the expenditure while ordinary resources 32 percent. Donations, transfers, and credit operations funded less than 8 percent of the expenditure.

The geographical distribution of expenditure within the country has been uneven. Lima, the country's capital, where more than half of the population resides, executed more than 30 percent of the expenditure during this period. The remaining 70 percent was divided among the nation's 23 departments. Although the greatest portion of the total expenditure was concentrated in Lima, expenditure is still below the national average. The expenditure per capita in Lima was US\$27.9 (the national average is US\$28.5)

and total expenditure accounted for 0.4 percent of the department's GDP (the average is 0.7 percent).

Public expenditure has been geared toward three overarching strategic objectives: environmental quality management, natural resource conservation, and environmental governance. Environmental quality management received more than 80 percent of the expenditure, as the government made a major public investment in water pollution management and solid waste management. More than 12 percent of the expenditure was devoted to promoting sustainable use of natural resources. The main activities were related to protected area management, reforestation, and researching, managing and enforcing fishery resources. Lastly, major efforts were undertaken strengthen environmental governance, contributing also to the other two major strategic objectives. The creation of environmental governing bodies (MINAM and OEFA), along with an increase in allocation of funds for activities related to environmental enforcement, monitoring and regulation, constituted major actions to incorporate environmental management into economic development processes.

A number of administrative results and outcomes were achieved during the period. The combined analysis of expenditures and results obtained in several areas of environmental management reveal different levels of effectiveness by area.

5.2 POLICY RECOMMENDATIONS: MOVING TOWARD A MORE EFFECTIVE PUBLIC EXPENDITURE

Despite the limits that exist when evaluating expenditure efficiency and effectiveness, the analysis of expenditure quality makes it possible to establish several policy recommendations.

ENVIRONMENTAL MANAGEMENT PLANNING

At the strategic level, environmental management planning and prioritization processes should be strengthened. To establish monitoring indicators, goals, and objectives, there should be appropriate information on the status of environmental quality, the degree of private sector regulatory compliance, the evolution of pressures, and the cost associated with fulfilling the established goals. Incorporating this information into the strategic environmental action plans facilitates prioritization when allocating pub-

lic resources. This information is also instrumental in establishing robust mechanisms for monitoring the effectiveness of expenditures.

MEASURING PUBLIC EXPENDITURE

Public budget information systems should be strengthened to record environmental expenditure transactions more precisely. In some cases, it is necessary to separate aggregate categories such as water supply and environmental sanitation to properly account for the portion of expenditure related to environmental activities. In others, it is important to distinguish more precisely the nature of the environmental activity funded.

INSTITUTIONAL FRAMEWORK

Environmental management responsibilities among government institutions must be assigned clearly. The roles should be clarified to a greater extent and be accompanied by technical capacity building. Duplications of roles and loopholes in environmental institution mandates should be eliminated. Particularly important is the need to strengthen the technical capacity of local and regional governments to facilitate coordination with national governing entities, thereby promoting effective environmental management at the local level.

ENVIRONMENTAL INFORMATION FOR REGULATORY PURPOSES

Reliable information on the status of the environment, pollution sources and the private sector's ability to comply with regulations is critical to designing effective environmental regulation. The existing standards such as EQS and MPLs ought to be revised to increase their effectiveness. Similarly, the system of sanctions ought to be revised to incorporate a scale of fines based on the severity of the environmental damage and its associated restoration costs.

ENVIRONMENTAL QUALITY MANAGEMENT

The expenditure level should be increased to guarantee an adequate provision of environmental public goods. The coverage and quality of the services provided such as wastewater and solid waste management, and biodiversity protection is compromised due to existing resource constraints. New investments are needed to increase coverage. Existing budget availability can't cover the recurring services' operation and maintenance costs. To ensure the sustainability of existing investments, increased revenue can be generated by revising the rates charged or introducing new payment schemes for services provided.

Public investment in pollution management that has been made to date should be complemented by activities that help reduce the pollution load

in the environment. For domestic pollution sources, increasing sewerage network coverage or solid waste collection should go hand in hand with an increased capacity for wastewater treatment and appropriate final disposal of all waste. In the case of nondomestic pollution sources, management instruments must be strengthened to shift the burden of responsibility for pollution reduction to the private sector. Instruments such as discharge permits should be established for the economic sectors with the greatest environmental impact. These permits should be accompanied by monitoring and enforcement activities that ensure environmental compliance.

BIODIVERSITY PROTECTION

Budgetary restrictions highlight the need to target expenditures on NPAs to achieve the greatest impact for biodiversity protection. Allocating funds to NPAs based on the level of threat to biodiversity or potential touristic appeal can yield better results. Furthermore, synergies with other activities aimed at reducing pressures (e.g., deforestation control) and restoring ecosystems (e.g., reforestation) outside the NPAs together with private sector and non-governmental organization involvement should be exploited to leverage efforts on biodiversity protection.

FOREST AND FISHERIES RESOURCES MANAGEMENT

The promotion of rights-based management policies should be accompanied by complementary investments. Monitoring and enforcement systems should be strengthened to guarantee compliance with policies aimed at controlling the overexploitation of resources. Investments in public goods such as research, plant health, and fire management are the basis for guaranteeing the sustainable use of resources in the long term.

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The Bank's current focus areas include three development challenges—social inclusion and inequality, productivity and innovation, and economic integration—and three cross-cutting issues—gender equality and diversity, climate change and environmental sustainability, and institutional capacity and the rule of law.

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