Review of Peru Interim Report

UNISDR Working Papers on Public Investment Planning and Financing Strategy for Disaster Risk Reduction

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UNISDR Working Papers on
Public Investment Planning and Financing Strategy for Disaster Risk Reduction

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Working Papers describe preliminary results or research in progress by the author(s) and are published to stimulate discussion on a broad range of issues on disaster risk reduction.

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List of Acronyms

BfR	Budgeting for Results
BMUB	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Germany
CBA	Cost Benefit Analysis
CCA	Climate Change Adaptation
CENEPRED	National Centre of Disaster Risk Estimation, Prevention and Reduction
DGIP	Directorate General of Public Investment
DGPP	Directorate General of Public Budget
DRM	Disaster Risk Management
DRR	Disaster risk Reduction
FONIPREL	Fund for the Promotion of Regional and Local Public Investment
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmBH
HFA	Hyogo Framework for Action
IDB	Inter-American Development Bank
INDECI	National Institute for Civil Defence, Peru
IP	Incentive Plan to Improve Municipal Management and Modernization
IPACC	Public Investment and Climate Change Adaptation
MEF	Ministry of Economy and Finance, Peru
MINAM	Ministry of Environment, Peru
OPI	Programming and Investment Office
PIP	Public Investment Projects
PNA	National Environment Policy
PREVAED	Budget Programme 068 Disaster Emergency Vulnerability Reduction and Response
PU	Production Unit
RA	Risk Analysis
RNE	National Building Regulations
SENAMHI	National Meteorological and Hydrological Service of Peru
SIGRID	Information System for Disaster Risk Management
SINAGERD	National System for Disaster Risk Management

SINPAD	National Information System for Response and Rehabilitation
SMC	Specific Minimum Contents
SNIP	National Public Investment System
UE	Execution Units
UF	Formulation Units
UNISDR	United Nations Office for Disaster Risk Reduction

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Introduction

In 2012, UNISDR started global project for around 30 countries: “Building Capacities for Increased Public Investment in Integrated Climate Change Adaptation and Disaster Risk Reduction: 2012-2015” financed by the European Union.

The programme composed of three components: the establishment of reliable disaster loss database (Component 1), risk evaluation and probabilistic risk assessment profiles (Component 2) and economic analysis and policy reviews to support incorporation of risk management into public investment planning (Component 3).

In Latin America, UNISDR decided to start with Component 3 because participating countries already have developed disaster loss database and probabilistic risk assessment profiles. Through discussion with participating countries, UNISDR identified the need for all participating countries to have a “national baseline” that explains the existing legal, regulatory, financial and methodological practices in decision making on public investment for DRR and CCA.

This document is to summarize such baseline in Peru. Loss analysis, risk profile and economic analysis - components of this programme to support evidence based decision making- will be later combined to make the final report.

This document contains the baseline for public investment in disaster risk management (DRM) and CCA for Peru. Created in 2000, the National Public Investment System (SNIP) is considered as a starting point. Since mid-2007, it has developed several instruments for mainstreaming disaster risk into the project cycle and, recently, in the context of climate change. Also considered is the National System for Disaster Risk Management (SINAGERD), created in 2011 with a mandate to manage risk from three different perspectives (prospective, corrective and reactive) and at the three levels of government (national, regional and local). A policy review on CCA relevant for public investment is also included.

The document has been divided into six narrative chapters and the conclusions section. Chapter 1 presents the general investment and budget frameworks. Chapter 2 outlines legal and regulatory framework for DRR/DRM and CCA. Chapter 3, the most important chapter in this document, highlights how DRM and CCA are incorporated in the development of the pre-investment studies of public investment projects. Complementary statistics suggests current challenges in the DRM/DRR mainstreaming in public investment. Chapter 4 lists up the methodological guidelines, which are well developed in Peru. Chapter 5 briefly explains contingency finance mechanism of the country. Chapter 6 focuses on the information management systems available for public investment and financial planners. The final section presents the conclusions of the document.

1. General Framework of Public Investment

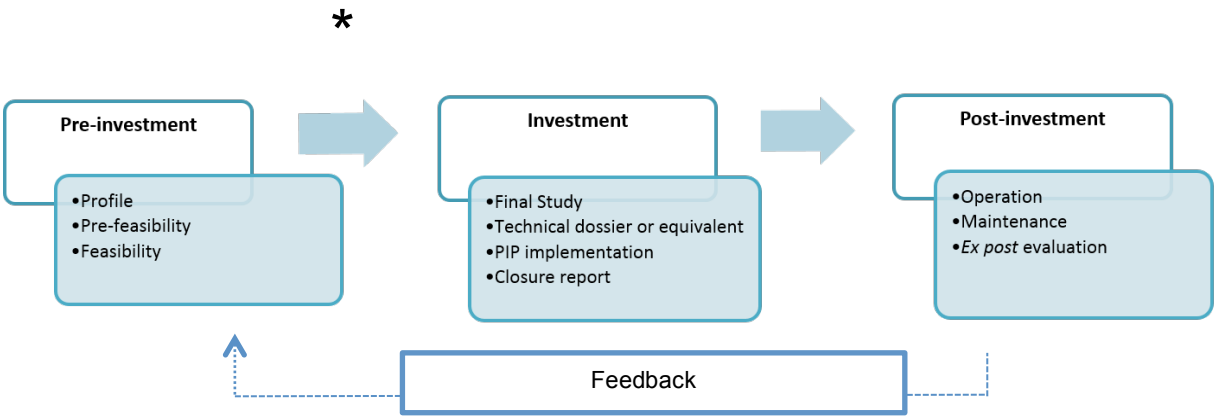
1.1 National Public Investment System (SNIP)

Public Investment Projects (PIPs) in Peru are part of the principles, processes, methodologies and standards established by the National Public Investment System (SNIP), an administrative system created in 2000.

SNIP defines PIPs as “any time-bound intervention fully or partially using public resources to create, expand, improve or recover an institution's capacity to produce or supply goods and services, and whose benefits are generated during the lifetime of the project and are separate from those of other projects.” Every PIP must be a solution to a problem related to the purpose of an entity and its powers; interventions linked to the operation and maintenance costs should not be considered as PIPs; or asset replacements that occur within interventions scheduled for a viable PIP and are associated with the operation of physical facilities for the operation of the entity, or that do not involve an expansion of the productive capacity of services.

The system presents a 'project cycle' comprising three phases: pre-investment, investment and post-investment. Different aspects of the project are developed in each of these phases, as detailed in Figure 1 below. As shown, these phases are sequential; for example, the beginning of the investment phase requires the issuance of a feasibility report for the last study approved in the pre-investment phase. Similarly, the lessons learned and recommendations from the post-investment phase inform new study proposals for the pre-investment phase and, in general, the administration and performance of the investment (MEF and JICA, 2012).

Figure 1: Phases of the project cycle in SNIP1

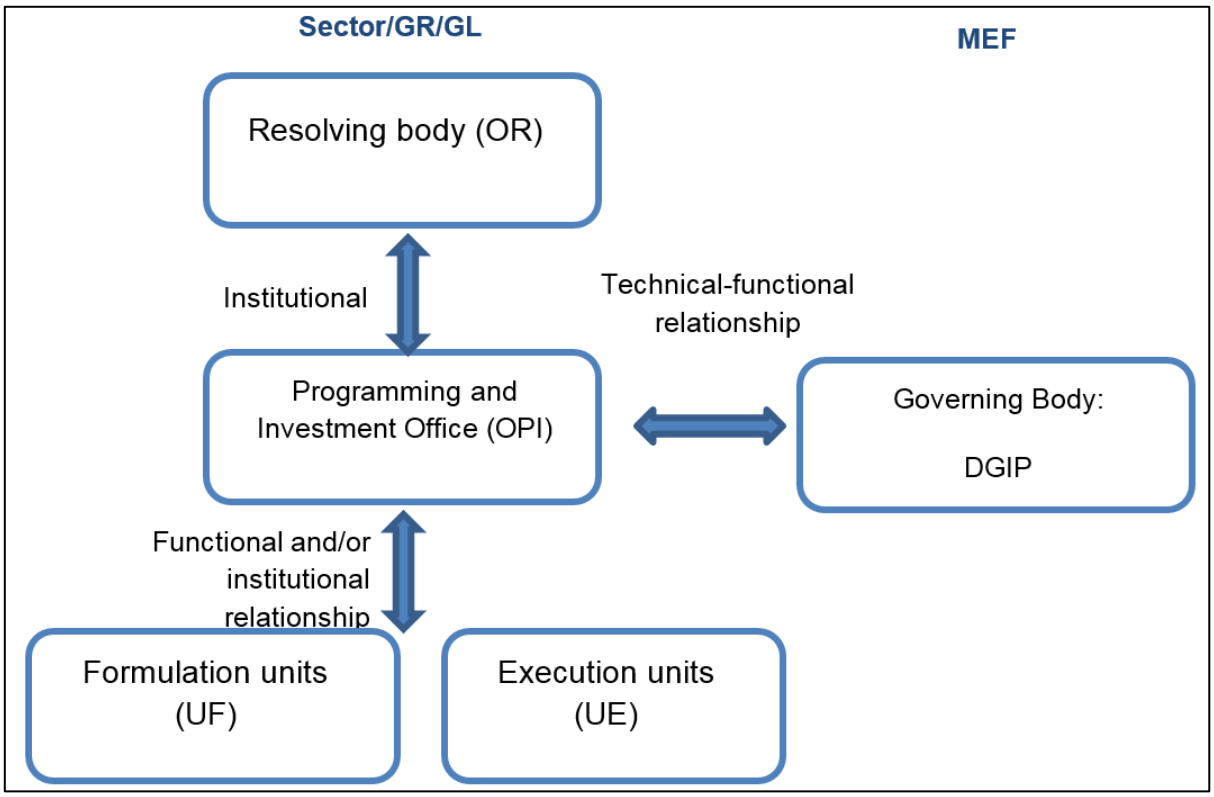


* Feasibility report

Source: Directiva General del SNIP, 2011.

Regarding the institutional framework of SNIP, each of the three levels of government (national, regional and local) have bodies that formulate, evaluate and execute PIPs, based on their competences. In this organization, the MEF is the governing body of the system through the Directorate General of Public Investment (DGIP). The programming and investment offices (OPI) in sectoral ministries and regional/local governments are responsible for project evaluation, while the formulation units (FU) and execution units (EU) are responsible for formulation and implementation as shown below (Figure 2).

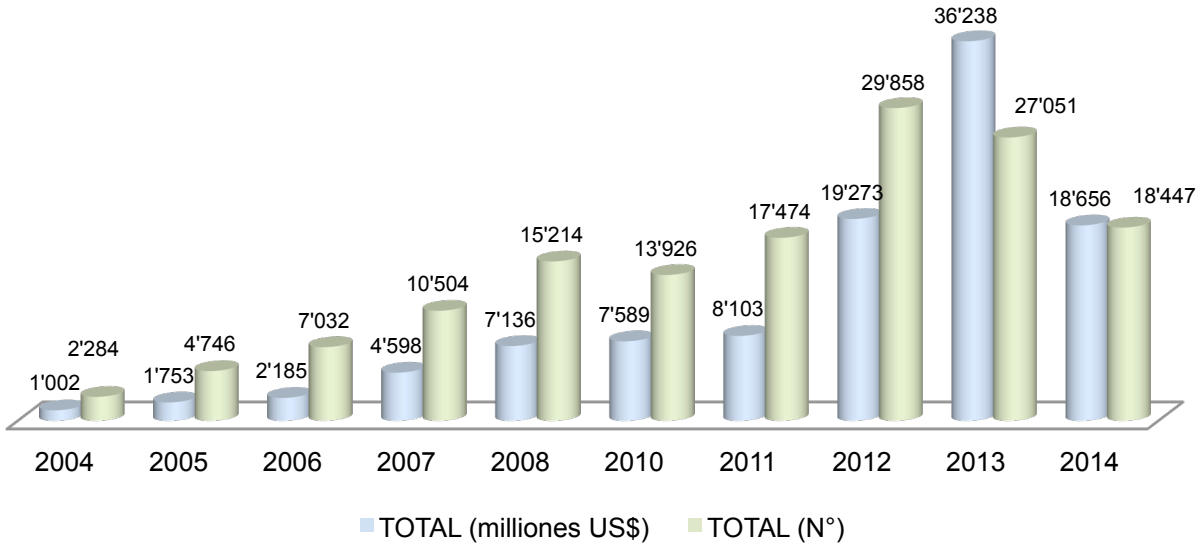
Figure 2: SNIP Organization



Source: SNIP General Guidelines.

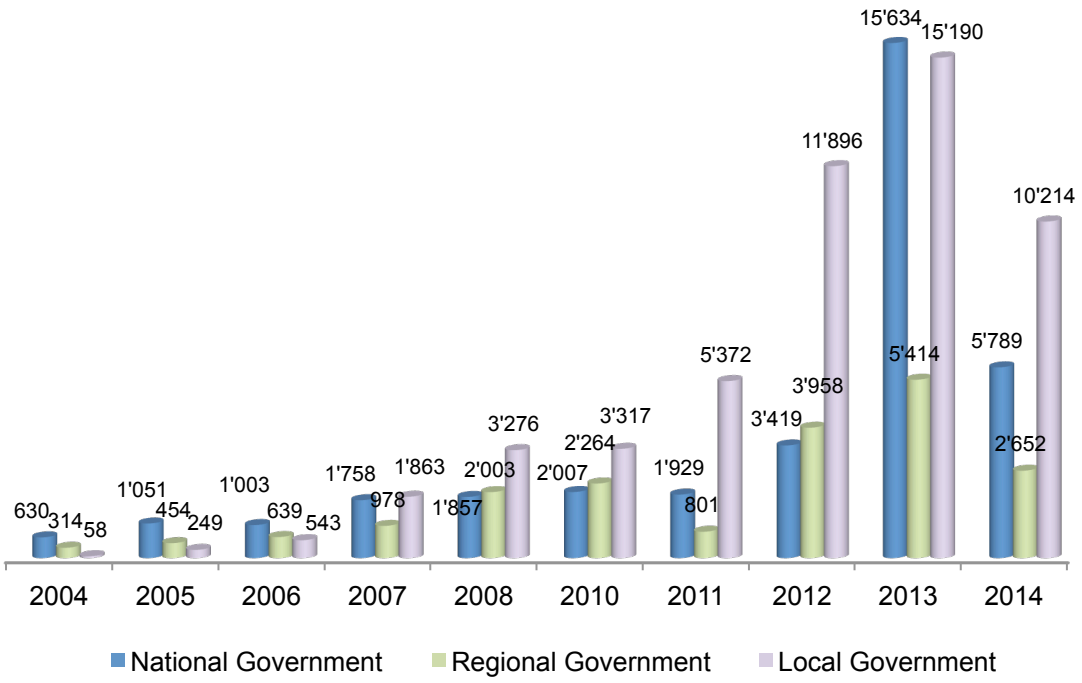
Between 2004 and 2014, a total of 146,536 projects have been declared feasible by the SNIP. In this period, statistics show an increase both in the number of feasible projects and the total investment amount per year (Figure 3). Beginning in 2007, a greater number of projects is observed at the sub-national levels (regions and municipalities), as part of the SNIP decentralization process (Figure 4).

Figure 3: Projects declared feasible (total investment amount and number of project)



Note: Exchange rate: 2.9 soles per dollar.
Source: SNIP Project Bank 30/11/2014.

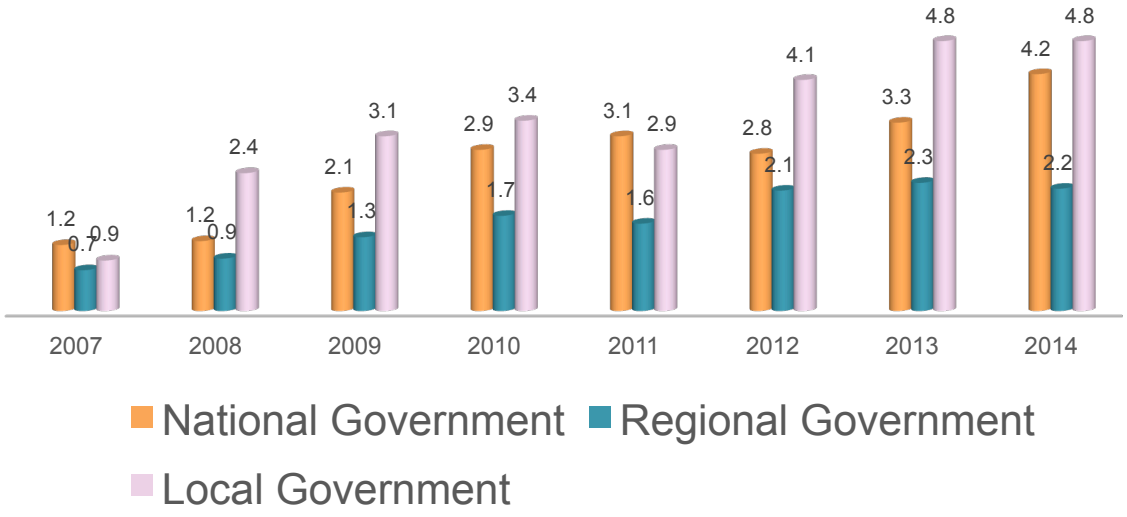
Figure 4: Viable projects by level of government (USD millions)



Exchange rate: 2.9 soles per dollar.
Source: SNIP Project Bank 30/11/2014.

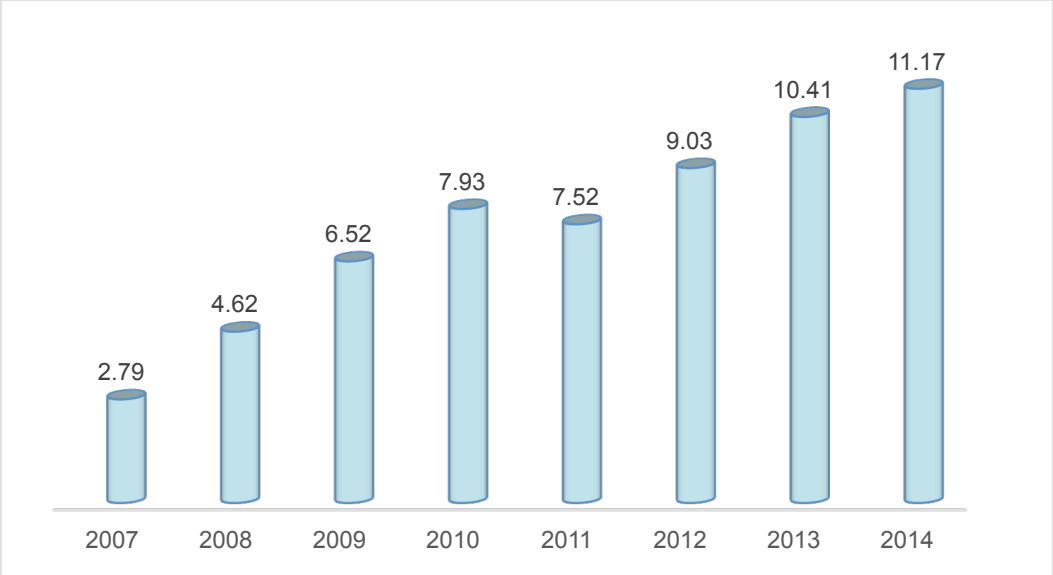
The investment carried out (investment phase) has also grown steadily over the last three years (2012, 2013 and 2014), exceeding by more than 5 times the performance achieved in 2007. Figure 5 below shows this trend, as does Figure 6 with information disaggregated by level of government (national, regional and local).

Figure 5: Amount of public investment disbursed (USD billion)



Exchange rate: 2.9 soles per dollar.
Source: SNIP-MEF Statistics and Reports, 31/01/2015.

Figure 6: Amount of public investment disbursed, by level of government (USD billion)



Exchange rate: 2.9 soles per dollar.
Source: SNIP-MEF Statistics and Reports, 31/01/2015.

1.2 Budgeting framework

Public investment projects are generally financed with budget resources allocated to each entity, which are approved every fiscal year in the Public Sector Budget Law and its amendments. As noted above, risk management is a cross-cutting element in all projects, and therefore one of the funding sources.

The Public Sector Budget includes the **Budgeting for Results** (BfR) management strategy, which links the allocation of resources to measurable outputs and outcome benefitting the population and is gradually implemented through: 1) budgetary programmes; 2) monitoring of performance indicators and physical production; 3) independent evaluations; and 4) management incentives. The instruments are proposed by the Ministry of Economy and Finance, through the Directorate General of Public Budget, in coordination with other government bodies. In Peru, the BfR strategy is governed by Chapter IV "Budgeting for Results," in Title III "Supplementary Rules for Budget Management" of Law 28411, General Law of the National Budget System.

To promote risk management in compliance with current regulations through BfR, two instruments are available:

- The Budget Programme 068 "Disaster Emergency Vulnerability Reduction and Response (Prevaed)".
- The Incentive Plan to Improve Municipal Management and Modernization (IP), with a component on disaster risk management.

Additionally, the **Fund for the Promotion of Regional and Local Public Investment (Foniprel)** exists as a mechanism to support PIP funding at the local and regional level. The resources of this competitive fund come mainly from the Contingency Reserve[1], which seeks to co-finance the development of pre-investment studies and implementation of PIPs to reduce gaps in infrastructure and basic services that have a significant impact on reducing poverty and extreme poverty. Since 2012, Foniprel has prioritized projects and pre-investment studies that integrate DRM.

The three budgetary instruments mentioned above (Prevaed, IP and Foniprel) are developed in greater detail below. These instruments primarily promote prospective, corrective and reactive risk management in PIPs.

[1] Law 30114, Law of Fiscal budget for fiscal year 2014 approved S/ 500 million (USD 172.4 million) for Foniprel.

1) The Budget Programme 068 'Disaster Emergency Vulnerability Reduction and Response (Prevaed)'

Prevaed is a multisectoral programme that aims to reduce the vulnerability of people and their livelihoods in the event of natural hazards and to this end, seeks compliance with the budgetary requirements by public member entities. In general, the expected outputs of this budgetary programme are:

- Geographic areas with natural hazard identification and monitoring.
- Public entities with disaster risk management mainstreamed in their development planning and management processes.
- Public entities promoting proper land management accounting for disaster risk.
- Population with control and protection measures against natural hazards.
- Essential services and safe buildings in the event of emergencies and disasters.
- Population with safe practices fostering resilience to natural hazards.
- Population with monitoring, surveillance and damage control in the event of emergencies and disasters.
- Population receiving assistance in emergency and disaster situations.

In particular, the main goals for 2014 included: 1) territorial hazard and risk zoning, development of protection infrastructure, implementation of safe schools and hospitals; and 2) implementation of emergency operations centres, development of early warning systems and availability of humanitarian aid supplies (Ferro, 2014).

Regarding the resources allocated for this budget programme that funds both projects and activities (current expenditure of entities), Table 1 shows an approximate eight fold increase in the last three years.

Table 1: Annual budget allocation of programme 068 (USD Million)

	2012	2013	2014
Total	146	401	1109
Projects	101	293	694
Activities	45	108	415

Notes: Exchange rate considered: 2.9.
The information corresponds to the Modified Institutional Budget (PIM).
Source: Economic Transparency Portal.

2) The Incentive Plan to Improve Municipal Management and Modernization (IP)

The IP is a Budgeting for Results (BfR) instrument that seeks to promote reforms for growth and sustainable development. The IP is carried out through the conditional transfer of funds upon the achievement of specific goals in municipalities. Once the achievement of goals is verified, the resources are transferred from the MEF to municipalities.

The IP includes disaster risk management among its 6 objectives. The verification of compliance with the goals proposed for that objective falls under the responsibility of Our Cities Programme (Programa Nuestras Ciudades, PNC) of the Ministry of Housing, Construction and Sanitation (MVCS) which reports to the Ministry of Economy and Finance (MEF) what municipalities have met the goals and thus determines their level of compliance.

The goals and compliance with the IP up to 2014 are available on the MEF Public Budget website, through the "IP history inquiry" ("consulta histórica PI") application, which contains data since 2010 for each district. [2] Table 2 shows the results for the DRM component.

[2] Available at::
<http://www.mef.gob.pe/index.php?option=com_content&view=article&id=2221&Itemid=101547&lang=es>.

Table 2: Goals of the IP's component on disaster risk management

Year	Goal	Compliance
2011	Identify areas of vulnerability and disaster risk in the locality.	1,156 of 1,834 municipalities
2012	Develop a technical study of hazard analysis and vulnerability for a critical sector of urban disaster risk identified in the field of housing, construction and sanitation.	215 of 249 municipalities
2013	The municipalities have been working on developing a PIP linked to disaster risk.	-
2014	Feasibility and/or technical dossier approved, as applicable to PIP related to disaster risk reduction.	In process until December 2014

Source: MEF.

3) Fund for the Promotion of Regional and Local Public Investment (Foniprel)

Since 2012, Foniprel has prioritized projects and pre-investment studies that integrate DRM and applies the following evaluation criteria:

- Include disaster risk management as established in the minimum contents of pre-investment studies: SNIP Annexes 05 and 07.
- The project objective should be related to the prevention and mitigation of disaster risk to natural hazards.
- Regional and local governments should preferably have regional and local DRM plans.
- Give preference to specific, explicit structural and non-structural prevention and DRR measures.
- Consider national or sectoral regulations to prevent, mitigate or reduce risk to natural hazards.
- In the case of demolition and an increased load on existing infrastructure, a report by those responsible for the evaluation of infrastructure is required –the technical inspector of Civil Defence or risk assessor, as appropriate.

The main results of Foniprel in terms of funding for pre-investment studies or risk management for PIPs are the following:

Table 3: Results of Foniprel for risk management

Description	2012	2013
Amount of approved investment (USD)	15,000,000	4,900,000
Number of PIPs	6	2
Number of studies	5	10

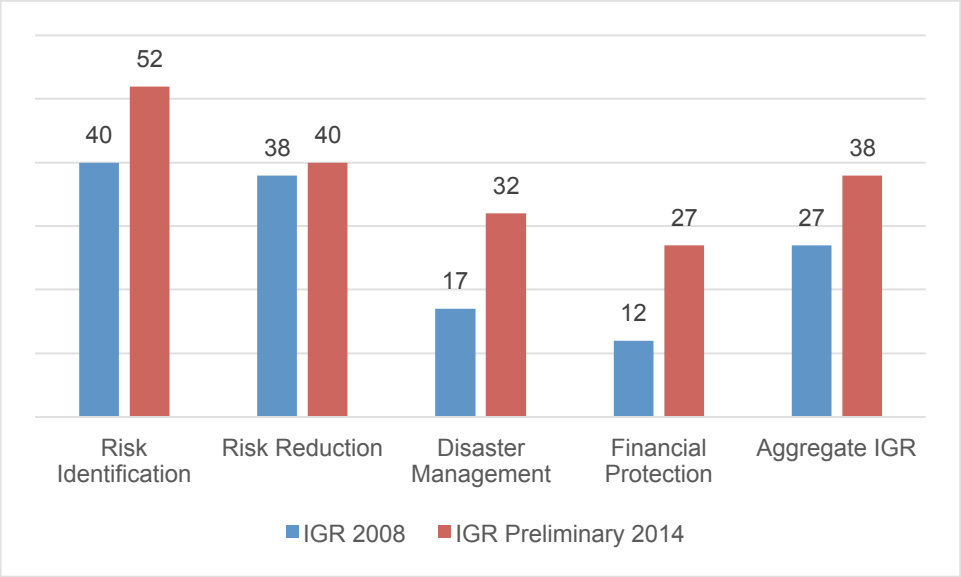
Exchange rate considered: 2.9.
Source: MEF, 2013b.

PIPs on “capacity building for integrated watershed management” whose objective is the protection, conservation and management of water, land and ecosystem resources of the watershed are also part of this competitive fund. Protection infrastructure such as dams and /or training walls and public infrastructure protection, containment slopes, ditches, and vegetation cover in critical areas prone to erosion (MEF, 2013b) is financed through these projects.

Impact of financial instruments

The combined impact of the various financial management instruments, including financial protection mechanisms briefly outlined in Chapter 5, has allowed Peru to improve its “Risk Management Index (RMI)” indicator. The RMI has been monitored by IDB in the areas of risk identification, risk reduction, disaster management and financial protection. Figure 7 shows the improvement of the indicator between 2008 and 2014.

Figure 7: RMI benchmarking for Peru, 2008 and 2014



Source: IDB, 2014.

In relation to improvements, it is noted that risk reduction remains a challenge because it is a lengthy process, linked to the results in risk identification and the development of PIPs. Political will has a key role in advancing these topics as they are conditional and “compete” with other priorities.

2. Legal Framework of Public Investment for DRR and CCA

The legal instruments described in this chapter demonstrate the linkages between disaster risk management, climate change adaptation and public investment in terms of specific policies and standards, which should be considered by State agencies that formulate and evaluate PIPs.

2.1. At the legislative level

At this level, there are two State administrative systems that ensure the legal framework for the development of public investment that includes risk management: a) the National System for Disaster Risk Management and its regulations, and b) the National Public Investment System and its regulations. The two systems and their thematic linking are described below.

a. Law 29664 establishing the National System for Disaster Risk Management (SINAGERD) and its Regulations

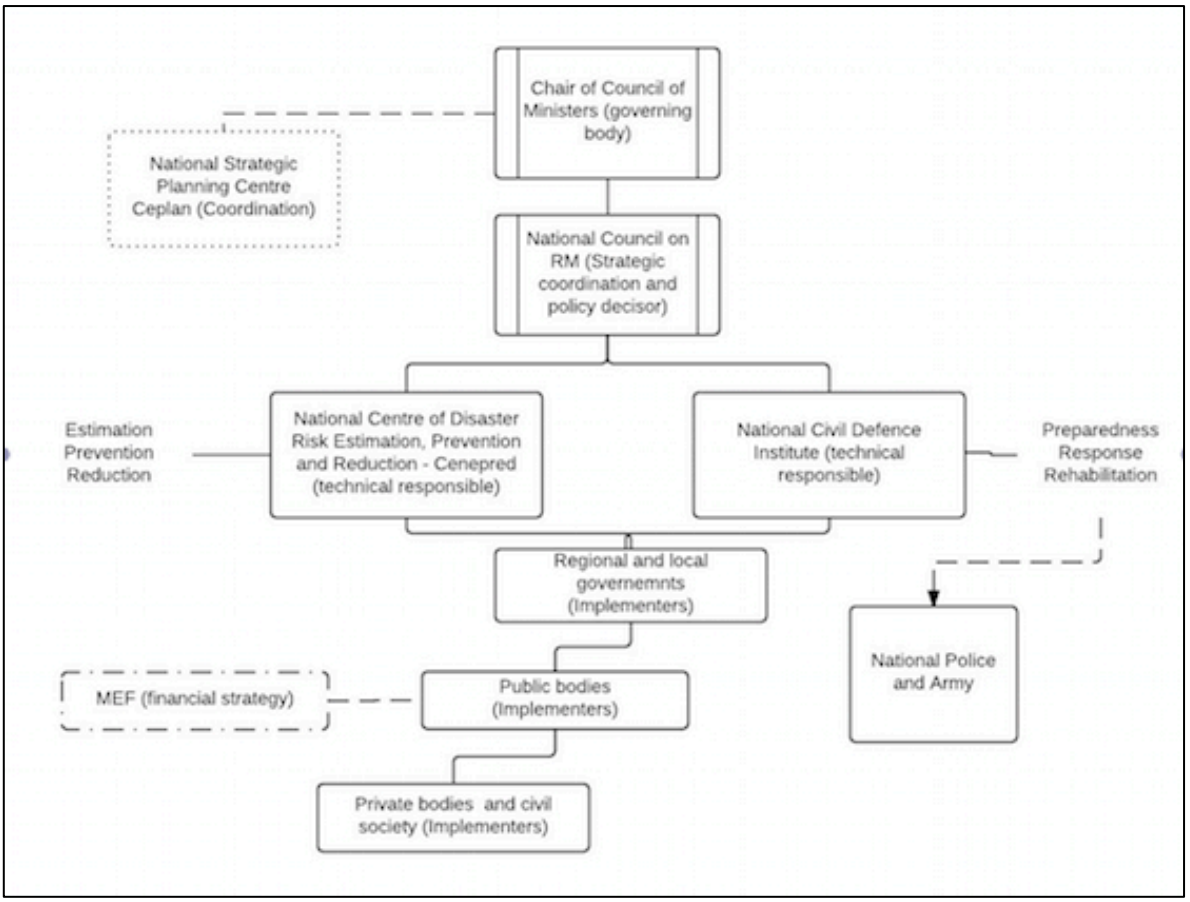
SINAGERD was created in February 2011 with the aim of identifying hazards, analysing vulnerabilities and establishing risk levels for timely decision making in DRM, while preventing and reducing risk, gradually avoiding the generation of new hazards and limiting their adverse impact, in order to contribute to sustainable development in the country (paragraph a. and d., Article 8 of Law 29664).

The Regulation under Law 29664 creating SINAGERD was approved by Supreme Decree No. 048-2011-PCM in May 2011, establishing the components, processes and procedures, as well as the roles of the entities in the system.

Clause 11.1 of the Regulations provides that regional and local governments incorporate DRM in their planning, land management, environmental management and public investment processes. For the latter, an analysis of development and investment projects is **required** to ensure the identification of: 1) the potential vulnerability of projects and how to avoid or reduce it; 2) the vulnerability that projects can create in society, the infrastructure or the environment and the necessary measures for its prevention, reduction and/or control; and 3) the ability of projects to reduce existing vulnerabilities within their field of activity.

The functional and organizational structure of SINAGERD is presented in Figure 8 below.

Figure 8: Organization and functions of SINAGERD



Source: Law 29664 and its Regulations.

b. Law 27293 governing the National Public Investment System and Regulations

Law 27293 (as amended) created the SNIP in June 2000 in order to optimize the use of public resources for investment, by establishing principles, processes, methodologies and standards. Article 4 establishes the linkages with other national, sectoral, regional and local plans which apply to all projects.

The Regulations of the National Public Investment System, approved by Supreme Decree No. 102-2007-EF/68.01 provides that the feasibility of a project is a prerequisite for the investment phase. PIPs are granted feasibility through their pre-investment studies when they have proved to be socially profitable, sustainable and consistent with the Policy Guidelines (paragraph 11.1, Article 11 of SNIP Regulations).

c. General Guidelines of the National Public Investment System

The General SNIP Guidelines approved by Directorial Resolution No. 003-2011-EF/68.01 in April 2011 establishes the mandatory technical standards, methods and procedures applicable to the pre-investment, investment and post-investment phases for all SNIP member bodies (see Figure 6). In their supplementary provisions, the Guidelines contain 27 annexes and 20 forms.

DRM and CC are made explicit in SNIP Annexes 05 and 07 as part of the topics to be developed in a profile level pre-investment and feasibility study, respectively. Similarly, the SNIP Form 03, which is the basis for recording

PIPs in the Project Bank, requires basic information on risk management. The contents of these annexes and forms on risk management are detailed in Figure 9 below.[3]

Figure 9: Contents in SNIP Annexes 05 and 07 and SNIP format 03 on RM

SNIP Annex 05: General Minimum Content of a PIP pre-investment study at profile level

- Consideration of SINAGERD, National System for the Assessment of Environmental Impact and likely impacts of CC, among others, to project sustainability
- Identification of hazards that can affect the PU, analysis and evaluation of exposure and vulnerability of the PU in the face of hazards identified
- Technical analysis of alternatives, consider disaster risk management
- Estimate the costs, social benefits and social assessment of risk reduction measures

SNIP Annex 07: Minimal Contents - Feasibility PIP

- Deepening the analysis of hazards (type, frequency, severity)
- Analyze exposure and vulnerability of PU against hazards identified previously in the study area
- Analyze and estimate the likely damages and losses that could occur if the hazard occurs and impacts the PU
- Include actions to reduce damages and/or losses that could be generated by the likeliness of occurrence of disasters in technical analysis
- Evaluation of the social profitability of measures to reduce disaster risks (MRRD)
- Demonstrate sustainability regarding disaster risk

Format SNIP 03: Registration from PIP

- Fill the following questions in the form: What are the hazards identified in the area of PIP? And what disaster reduction measures are being included in the PIP?
- Indicate investment costs associated with the measures of disaster risk reduction.

Source: MEF.

d. Guidelines No. 003-2013-EF/63.01 on the simplified method to determine the eligibility of public investment projects on disaster emergency[4]

These guidelines approved by Directorial Resolution No. 012-2013-EF/63.01 establish the legal basis, scope, definitions and institutional competencies for emergency PIPs to be considered as such and, therefore, follow a simplified procedure through technical card 1 (post-disaster) or technical card 2 (imminent hazard).

The objective of emergency PIPs for FY 2014 was established in the Guidelines as follows:

a. Rehabilitate damaged public infrastructure, once the disaster or major disaster has occurred, recovering the provision of interrupted services with short-term and temporary support.

b. Reduce the likely damage that may be generated by the impending impact of a natural or man-made phenomenon, as determined by the technical-scientific public body concerned (imminent danger).

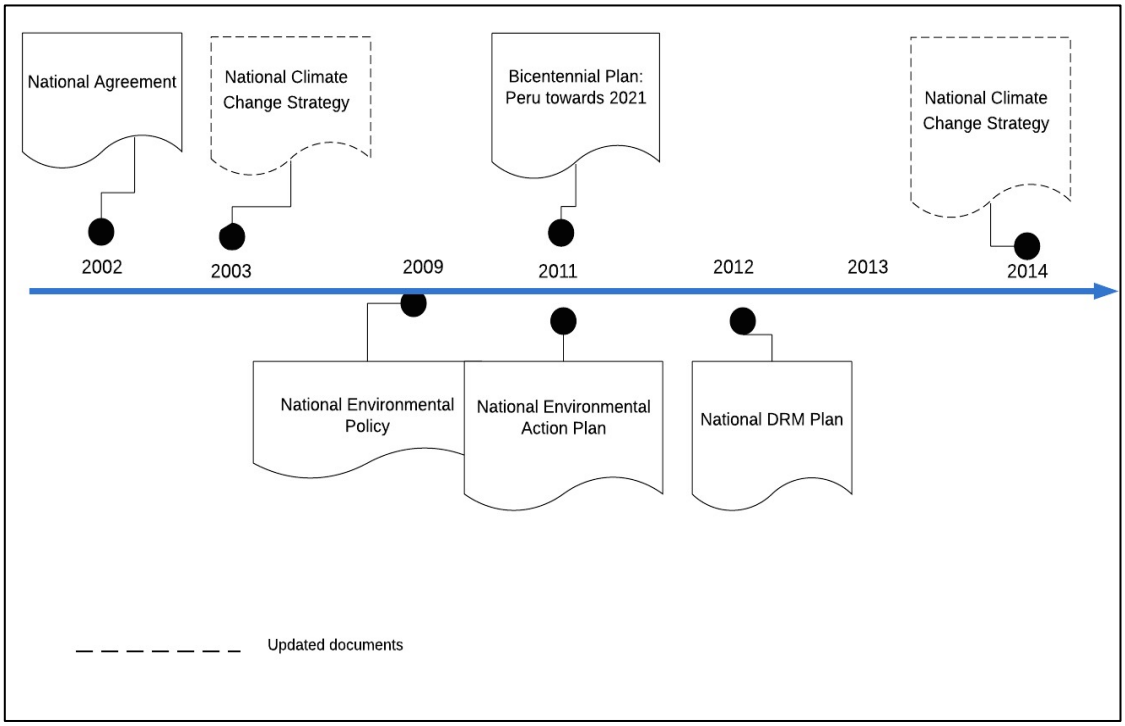
[3]SNIP Annex 05 and 07 are approved by Directorial Resolution No. 008-2013-EF / 63.01 in October 2013, and by Directorial Resolution No. 003-2011-EF / 68.01 in April 2011. They establish the organizational structure of the pre-investment study, as well as the information and guidance on each of the topics developed. Format SNIP 03 serves as affidavit according to Supreme Decree No. 102-2007-EF.

[4] Approved by Directorial Resolution No. 012-2013-EF/63.01.

2.2. At the policy level

The following Figure (Figure 10) summarizes the policies linking disaster risk management, climate change adaptation and public investment according to the period in which they were adopted and published —details presented below to explain the link between them.

Figure 10: Timeline for DRM and CC policies affecting public investment



Source: Author

a) The National Agreement

The National Agreement was signed in July 2002 and is a set of policies that seek to achieve sustainable development in the country in the context of democratic governance. The two policies linking public investment with DRR in the Agreement are described below.

The National Policy 32 on Disaster Risk Management, paragraph c., states that the State shall “prioritize and guide policies on disaster risk estimation and reduction consistent with the national development objectives of development plans, policies and projects at all levels of government.”

The National Policy on Water Resources (National Policy 33), paragraph k., states that the State shall “plan and promote public and private investment in water collection and availability in order to: optimize efficiency in the use and re-use of water, prevent risks, mitigate the effects of extreme events, treat effluents, as well as obtain future alternative sources of water, including desalination, to balance and regulate the supply and demand of water for different uses.”

b) Peru 2021: Bicentennial Plan

The Bicentennial Plan was approved by Supreme Decree No. 054-2011-PCM, in June 2011, and is a long-term plan with national development policies to be implemented in Peru. One of its strategic axes emphasizes the need to reduce vulnerabilities to achieve sustainable development.

The strategic axis 6 on natural resources and the environment, policy guideline 10, encourages “the reduction of vulnerabilities and disaster risk management in the context of sustainable development, as well as adaptation to mitigate the negative effects and take advantage of opportunities arising from the positive impacts of recurring phenomenon El Niño.'

c) National Policy on Disaster Risk Management

The National Policy on Disaster Risk Management was approved by Supreme Decree No. 111-2012-PCM in November 2012 and aims to provide guidance to "prevent or reduce disaster risks, avoid generating new risks and adequately address preparedness, care, rehabilitation and reconstruction in disaster situations and minimize their adverse effects on the population, economy and environment."

The direct implications for public investment are identified in Goal 3 of the Policy —which proposes to incorporate and implement DRM through development planning and prioritization of physical and financial resources—, as well as in the following clauses:

- Clause 3.1: "Promote the mainstreaming of disaster risk management in land use planning, urban-rural development planning, public investment and environmental management, at the three levels of government."
- Clause 3.4: "Prioritize the approval of investment projects that include the disaster risk management approach in the context of development planning instruments, such as concerted development plans and participatory budgets.'
- Clause 3.6: "Prioritize resources to ensure adequate financial capacity, that allow for the implementation of public investment activities and projects in disaster risk management processes."

d) The National Environmental Policy (PNA)

The PNA was approved by Supreme Decree No. 012-2009-Minam in 2009 and aims to improve the quality of life of people, ensuring the existence of healthy, viable and functional ecosystems in the long term; and sustainable development in the country.

The PNA policy line 1 -Conservation and sustainable use of natural resources and biodiversity— in the Chapter on CC mitigation and adaptation identifies the following policy: "encourage the implementation of climate change mitigation and adaptation measures with a preventive approach, accounting for the particularities of the various regions of the country."

The inclusion of the context of climate change in PIPs could encourage the identification of "adaptation measures", as established in PNA policy line 1.

e) National Environnemental Action Plan (PLANAA): Peru 2011-2021

The PLANAA is a long-term national environmental planning instrument based on the results of the environmental situation and management of natural resources. It proposes the same objectives as the National Environmental Policy.

Among the priority actions of the priority goal "forests and climate change" there are two that could be achieved in part with public investment, namely:

- Estimate and reduce vulnerability to climate change (Action 4.4).
- Manage disaster risk and incorporate it into the planning and budgeting system at the national, regional and local level (Action 4.8).

f) The National Strategy on Climate Change (updated)

The National Climate Change Strategy (preliminary version) presented by MINAM in August 2014 is a guiding framework for each entity to develop and implement their action plans to mainstream climate change issues.

The lines of action 1 of the Strategy are linked to public investment and risk management through the following approaches:

- Strengthening regional and local governments to incorporate climate change in the development of macro-regional, regional and local planning and management policies and tools.

- Promoting climate risk management and related measures in the design of technical standards for infrastructure planning in rural and urban development that includes provisions for climate-related disaster risk.

g) Regional Climate Change Strategies

For environmental and land use matters, regional governments are responsible for "formulating, coordinating, conducting and monitoring the implementation of regional strategies on biodiversity and climate change, within the framework of relevant national strategies" (paragraph c., Article 53 of Law 27867, Organic Law of Regional Governments).

This strategy seeks to identify the most vulnerable areas and sectors in each region in order to take action to reduce the negative impacts of climate change, including those with greatest potential for GHG mitigation.

Most strategies developed by the regions establish guidelines or strategic objectives that link climate change and public investment. For example, the Regional Strategy on Climate Change of the Piura region (Regional Government of Piura, 2013) lists among its strategic actions "... in consultation with municipalities and key stakeholders, implement pilot projects or measures to reduce vulnerability and increase adaptation capacity in key activities for regional development: agriculture and fisheries (artisanal and industrial)."

2.3. Building Standards

Though it is not directly related with public investment, the different sectors have technical standards governing the incorporation of some DRM measures that aim to reduce/eliminate exposure and/or vulnerability. These standards are primarily established in the **National Building Regulations** (RNE), approved by Supreme Decree No. 011-2006-VIVIENDA in May 2006 and its amendments. The RNE standards relating to measures to reduce or eliminate risk are described below.

a. RNE Education Sector Standard A.040

This standard places special emphasis on actions to reduce or eliminate exposure primarily to geological hazards:

Buildings for educational use should be located in the places specified in the Urban Plan and/or considering, among others, the following: 1) access through pathways that allow entry of emergency response vehicles; 2) topography with slopes less than 5%; and 3) low risk in terms of soil morphology and likeliness of natural disaster occurence (Article 5 of the Standard A.040).

b. RNE Health Sector Standard A. 050

This standard stipulates the conditions for health sector buildings in order to reduce or eliminate exposure primarily to geological and hydro-meteorological hazards. In particular, it states:

As for the location, the grounds of health buildings shall meet the following requirements:

- *Be predominantly flat.*
- *Be removed from areas subject to erosion of any kind (avalanches, landslides, etc.).*
- *Be free of faults.*
- *Avoid ravines and flood-prone land.*
- *Avoid sandy, swampy, clay, silt land, former riverbeds and/or presence of organic waste or landfill land.*
- *Avoid land with groundwater (at least 2.00 m deep without detecting water flow).*
- *Being far enough from oceans, rivers, lakes and lagoons, or high enough to avoid being flooded as determined by hydraulic studies.*

c. RNE Standard E.030. EQRD

This Standard establishes minimum technical conditions to reduce earthquake fragility in buildings, which must have an earthquake-resistant design.

In the case of health facilities, Standard E.030, Annex 03 provides that:

Health care facilities such as hospitals, institutes and the like as classified by the Ministry of Health, located in seismic zones 3 and 2 of the seismic map of Peru, should be designed with seismic protection systems: base isolation or energy dissipation devices. While there is no Peruvian technical standard, the design will be done according to standard ASCE / SEI 7 latest edition.

d. RNE Standard A.130. Safety requirements

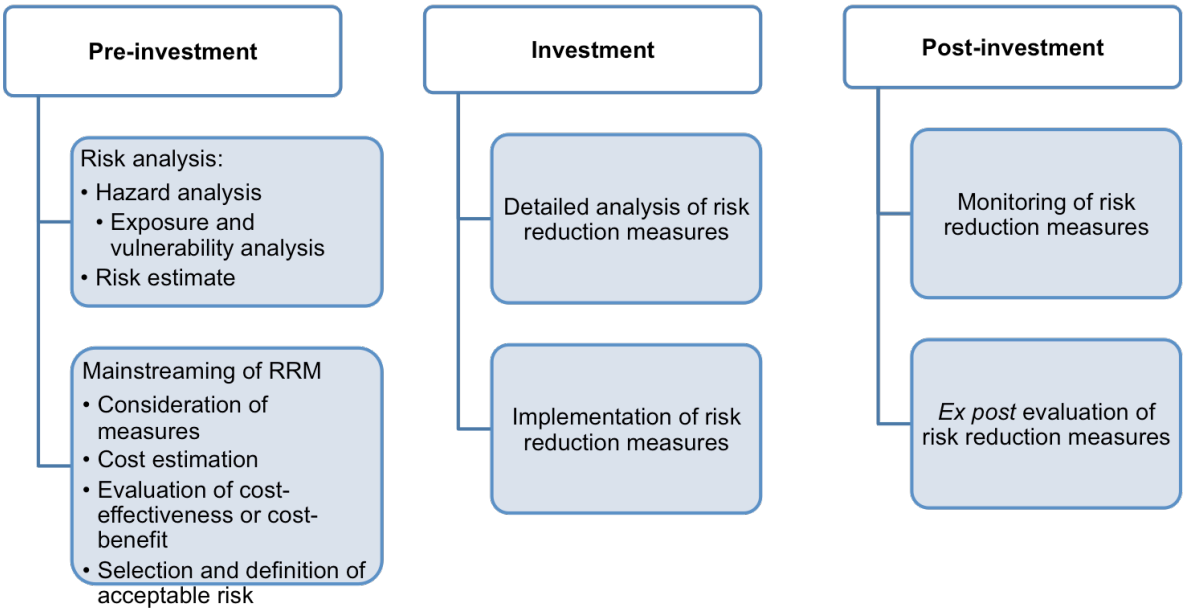
This Standard sets the conditions for increasing resilience in all types of buildings, in particular:

- Establishment of *concepts and calculations to ensure adequate evacuation systems depending on the type and use of the building. These are the minimum requirements that every building should meet (Chapter 1: Evacuation systems).*
- *Establishment of signals and their sizes to protect architecture (Chapter 2, Safety signs).*
- *Protection of fire barriers (Chapter 3).*
- *Fire alarm and detection systems (Chapter 4), among others.*

3. Mainstreaming disaster risk management and climate change in PIP formulation

PIPs formulated and evaluated within the framework of SNIP should incorporate risk analysis (RA) and manage it through risk reduction and adaptation measures, as appropriate throughout the entire project cycle, i.e., beginning in the pre-investment phase when levels of exposure and vulnerability to hazards are identified for public goods and/or services producer unit (PU) and measures defined (Figure 11)[5]; then in the investment phase these measures are implemented and subsequently monitored and evaluated ex post (see Figure 11).

Figure 11: Project cycle and risk management



Source: MEF.

With regards to the timeline, mainstreaming disaster risk analysis and management in the PIP cycle began with the conceptual discussions to establish definitions and the relevance of this issue for public investment and, in general, sustainable development (Lavell, 2014, 2013). In 2007, these discussions were conveyed in the document "Conceptos asociados a la gestión del riesgo de desastres en la planificación e inversión para el desarrollo" ["Concepts associated with disaster risk management in development planning and development"], updated in 2013 (MEF, 2013a), which recognizes the importance of and norms for governing disaster risk management and climate change in Peru. PIPs now incorporate "risk management in the context of climate change."

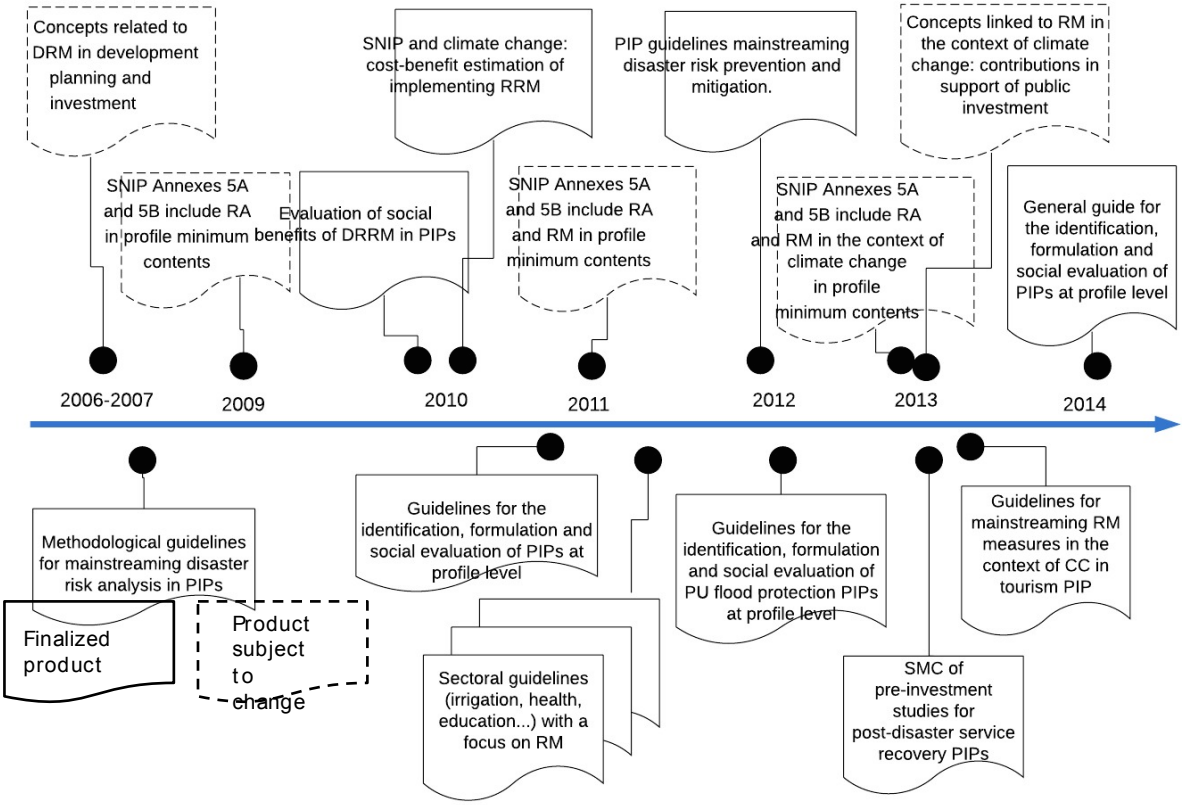
Since 2009, SNIP indicates, in the general minimum contents of PIP profile studies, that DRM must be included to reduce the damage and losses generated by the probable occurrence of a disaster; and, their last update (2013) further reinforced these issues, emphasizing the consideration of other systems such as the National

[5] A unit producing goods and/or services in the SNIP, according to SNIP Annex 05 (2013), refers to the set of resources (infrastructure, equipment, personnel, management skills, among others) that, when articulated, have the ability to provide public goods and/or services to the population. PUs can be an educational institution, a health centre, a road, a water supply and sewerage system.

System for Disaster Risk Management (SINAGERD), identifying disaster risk management measures and its social evaluation, and a review of likely impacts of climate change on project sustainability.[6]

These specifications to the minimum contents are being integrated into the various methodological tools for the development, formulation and evaluation of projects. The following Figure summarizes the evolution of the mainstreaming of DRM in PIPs in the context of climate change.

Figure 12: Timeline of DRM mainstreaming in PIPs



Source: MEF.

Figure 8 lists the tools available to SNIP policy-makers and evaluators in Peru in order to improve their knowledge on the application of disaster risk management in the context of climate change in PIPs.

The following chapters of this document will further explore these tools. Below, we will review the methodological steps comprising RA and DRM in the formulation of a PIP based on the general minimums and the relevant guidelines/standards, particularly information from the *General guide for the identification, formulation and social evaluation of investment projects at the profile level* (MEF, 2014).[7]

3.1. Pre-investment studies at the profile level and risk management in the context of climate change

The profile level is the first pre-investment study applicable to all PIPs in the project cycle. Depending on the amount or the need for additional studies, this profile may be approved and declared feasible or require further

[6] Minimum content applies for pre-investment studies and points out what should be the structure of the topics of a study, provides guidance and directions. Minimum contents are approved by Directorial Resolution and are an annex to the existing SNIP General Guideline.
[7] Published in SNIP Annex 05, approved with Directorial Resolution No. 008-2013-EF / 63.01 and replace SNIP Annexes 5A and 5B approved in 2011.

work to obtain the feasibility report. Given their relation to the feasibility report, we will review the methodological steps of the RA and DRM in the context of climate change in the profiles.[8]

We begin with a review of the thematic structure of a profile and the relevance of each topic to ensure that a PIP is relevant, socially profitable and sustainable, and therefore meets the conditions of the feasibility report. Figure 9 shows the four basic modules of a profile: general aspects, identification, formulation and evaluation.

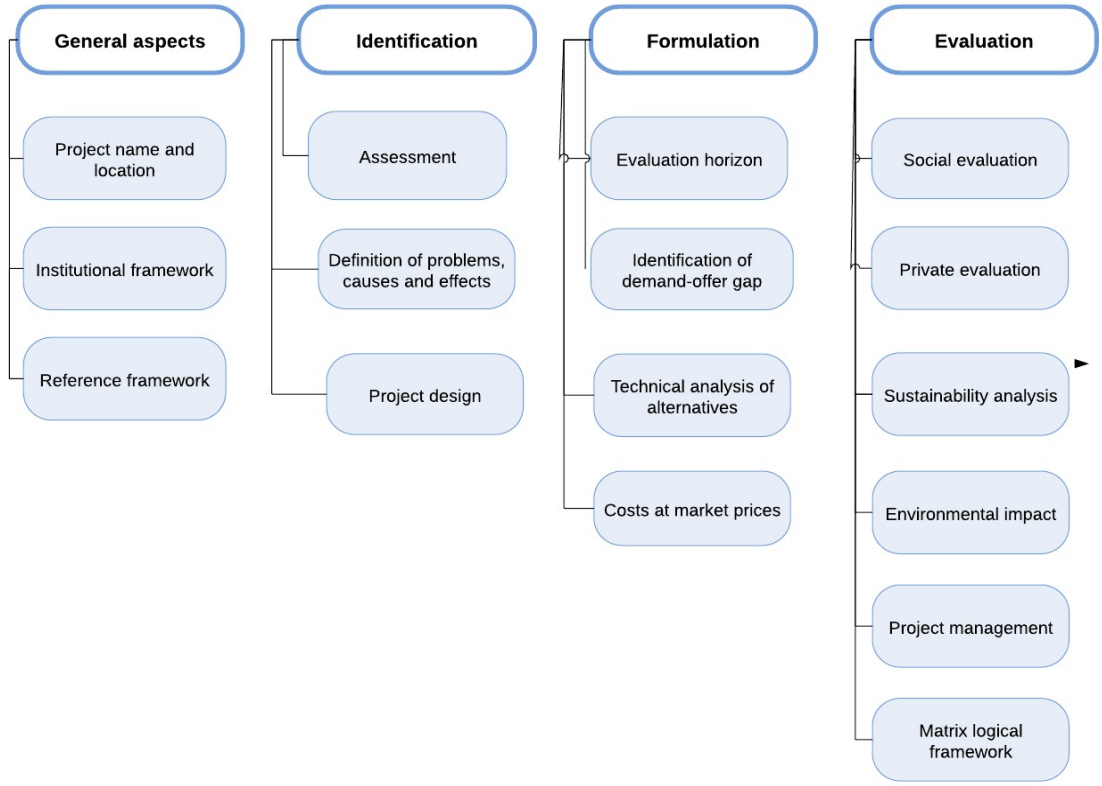
The "general aspects" module should be updated as the study progresses and must: 1) properly establish a project name that demonstrates the nature of the intervention, the good or service to be addressed and the location; 2) indicate the institutional framework of the project cycle by identifying the entities that will formulate, execute and operate the PIP; and 3) ensure relevance, i.e., that the PIP is consistent with the policies, plans and standards, and solves the problem of users or beneficiaries.

The purpose of the "identification" is to raise a solution to the problem identified in the assessment, through an objective to be achieved through a set of resources and actions that enable alternative solutions.

The "formulation" module aims to identify the deficit of services that could be addressed by the PIP and explore the technical aspects of alternative solutions (location, technology, scope and time), set goals, requirements and costs at market prices (investment, replacement, operation and maintenance).

Finally, the "evaluation" consists of a social evaluation of each alternative in terms of cost-benefit or cost-effectiveness, as appropriate; this module also addresses the sustainability of the PIP in order to ensure that it provides the services within the expected timeframe and without interruption. The assessment of the environmental impacts of the PIP including prevention, correction and/or mitigation according to the current regulations is also performed. Finally, this module presents the approach to project management in the investment and post-investment phases and summarizes the main results in the logframe (Figure 13).

Figure 13: Organization of the main areas of a PIP profile

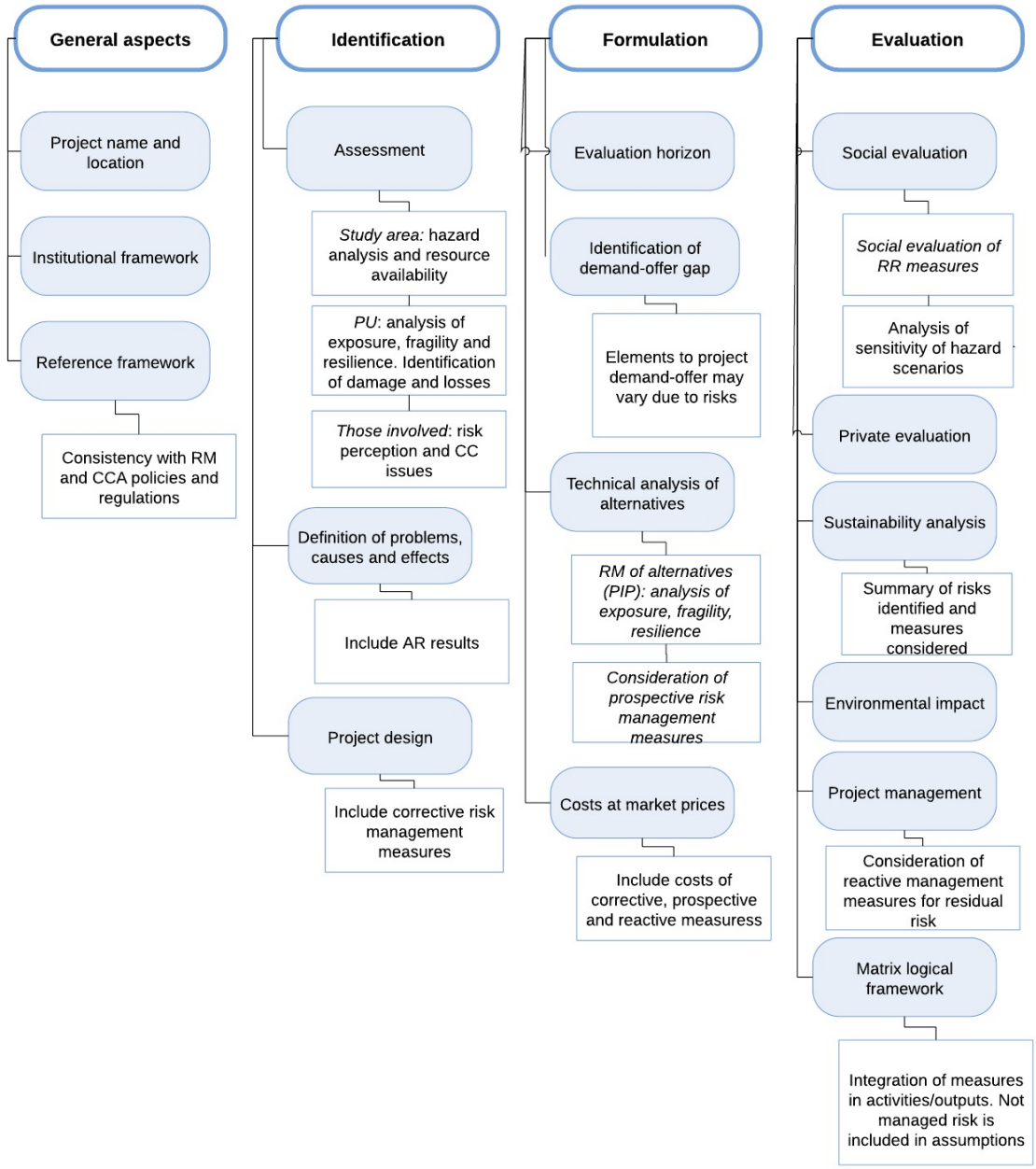


Source: SNIP Annex 05.

[8] It is also possible that the profile study is rejected or observed, only in the second case can be improved and re-assessed.

All four modules also include RA and DRM in the context of climate change as a cross-cutting topic (see Figure 14) that is complemented by the analysis and general proposal of the PIP. Thus, regardless of type or sector of the PIP, this approach involves the mainstreaming of risks in all projects and contributes to the fulfilment of the conditions of relevance, social profitability and sustainability.

Figure 14: Mainstreaming DRR and climate change in PIPs through pre-investment study



Source: MEF, 2014.

As shown in the Figure above, social risk is managed at three levels: corrective, prospective and reactive—during the development, formulation and social evaluation of a PIP.

Corrective management in PIPs is defined as “the set of actions planned and implemented in order to correct or mitigate risk in the public goods and/or services producer unit (PU)” (MEF, 2013a p. 61). Such management

begins in the identification module with the PU risk analysis, and continues with the assessment of stakeholders where users may provide further details on potential risks in the PU.

The methodological steps of the RA are listed below. The exception is where there is no PU in place, i.e., in projects that will provide the good or service to areas where there is no capacity to provide it; according to the MEF (2014) this kind of intervention is called "creation" and only the hazard analysis (point a) will be performed.

a) *Hazard analysis.* Consists of identifying, evaluating and building hazard scenarios (considering historical data and future scenarios) relevant to study areas that could impact the PU or PIP.[9]

b) *Exposure analysis.* Based on the knowledge of the current location of the PU, it determines whether it is within the area of impact of relevant hazards.

c) *Fragility analysis.* Assesses if the structural aspects of the PU (engineering, technology, materials, etc.) are resistant enough to withstand the impact of a hazard.

d) *Resilience analysis.* Assesses whether the PU has the capacity to respond to the impact of a hazard and the means available to reduce service interruption during this period. Issues assessed include: 1) Does the PU rely on alternatives to provide the service? and 2) Are there management tools such as contingency or emergency plans?

e) *Identification of damage and losses resulting from hazards.* Where the previous steps suggest that the existing PU is at risk, the likely damage and consequences should be noted, including: 1) costs of post-disaster emergency care, rehabilitation and recovery of services; 2) decrease of benefits perceived by users; and 3) additional social costs associated with the interruption in service and those perceived by users.

When the PU is at risk, the formulator should indicate these results in the analysis of the problem, causes and effects; for example, one cause could be that the design does not consider the "sliding" risk (landslide, mudslide, etc.). To reverse the negative situation, i.e., to reduce or eliminate risk, during the project design proposals for actions, each risk should be addressed. In the context of risk management, these are corrective management measures; for example, actions may include slope stabilization in critical sections and/or the construction of sewers, among others.

PIP **prospective management** is "the set of actions that are planned and implemented to avoid and prevent future risk that could arise with the development of PIP" (MEF, 2013 p.59). This category of management occurs mainly in the "formulation" module with the technical analysis of the alternative solutions proposed in the previous module (identification). The methodological steps are:

a) *Hazard exposure analysis.* Considering the hazards already identified for the study area, an analysis is performed of whether the PIP or some of its elements could be located within the area of impact of any of the hazards. If so, measures to reduce exposure should be proposed, such as relocation or the reduction of the area of impact of the hazard.

b) *Analysis of fragility to the impact of hazards.* Considers whether the PIP or any of its elements could be fragile (low resilience) due to structural aspects (engineering, technology, materials, etc.). If so, measures to reduce fragility should be proposed concerning, for example, the proposed design, materials used and compliance with technical standards.

PIP **reactive management** is defined as "the set of actions and measures to cope with disasters either from imminent danger or risk materialization" (MEF, 2013a p. 62). This category of management takes place in the "formulation" and "evaluation" modules. The methodological steps are:

a) *Analysis of resilience to the impact of* hazards (module "formulation"). Following the exposure and fragility analyses, the technical analysis of alternatives assesses whether the PIP has the capacity to respond to a disaster and, in particular, if there are alternatives for providing the service; if this capacity does not exist, it should be proposed as a measure to increase resilience.

b) According to acceptable risk or if residual risk exists, the chapter on project management ("evaluation" module) should propose management tools (emergency and contingency plans,

[9] Within the SNIP, area of study is defined as the geographical space where the beneficiary population, the production unit of the good or service is located; PUs to which others beneficiaries can access; and location of the project (considering the various alternative locations).

response protocols) and capacities for timely response (early warning system, awareness and organization of users, spare parts and materials for recovery, among others).

On the other hand, Figure 8 also shows that risk reduction measures are evaluated socially, i.e., their social costs and benefits are compared. While this evaluation is performed in the "evaluation" module, the information is built throughout the previous modules. The process is as follows:

"Formulation" module

a) *Identification of damage and losses resulting from hazards*. Probable damage and consequences are identified in the case that the risk mitigation measures identified are not implemented. Damage and losses may include: 1) costs of emergency care, rehabilitation and recovery of services after the disaster; 2) decrease of benefits perceived by users; and 3) additional social costs associated with the interruption in service and that are perceived by users.

b) *Estimated costs of risk reduction measures at market prices.* Investment, operation and maintenance costs of risk reduction measures should be calculated.

"Evaluation" module

a) *Estimated social benefits of risk reduction measures.* In this case, the methodology of "avoided costs" applies, i.e., costs associated with the occurrence of the hazard (when no action is taken) become the social benefits of implementing the measures. Here, the information on the damage and losses previously identified may be useful.

b) *Estimated social costs.* These are the investment, operation and maintenance costs at market prices that must be expressed at social prices.

c) *Estimated cost-benefit of risk reduction measures.* The current social net value of the measures is estimated, at the current social discount rate (9%). This quantification is performed for each hazard scenario proposed during the hazard analysis in the 'identification' module.

It should be noted that, where the investment costs of the DRR measures represent 5% or less of the total investment costs of the project[10], this evaluation shall not be performed. In addition, all measures that relate to earthquake risk reduction are NOT assessed socially. These should be integrated into the project.

Finally, Figure 10 shows that all PIP must comply with current regulations on disaster risk management and climate change adaptation. This should be summarized through a "consistency matrix" in the "general aspects" module. The next chapter of this report will delve into the most relevant regulatory aspects.

3.2. Statistics on the integration of risk management in the context of climate change in the PIPs

The process of mainstreaming DRM in the PIP has been monitored since April 2011 through PIP record sheets —SNIP Form 03— registered in the SNIP Project Bank. Prior to this period, there are the results of feasibility assessments and the systematization of feasible projects of two regional governments (Cusco and Piura) between 2009 and 2011.

Feasibility assessments are conducted through annual samples and seek to measure the quality of the statements issued by the bodies that make up the SNIP, under the DGIP, as established in the SNIP regulations. The 2007 assessment evaluated, among other things, the development of risk analysis, which revealed that the identification of natural or man-made hazards in most PIPs by sector was limited or absent (MEF, n.d.).

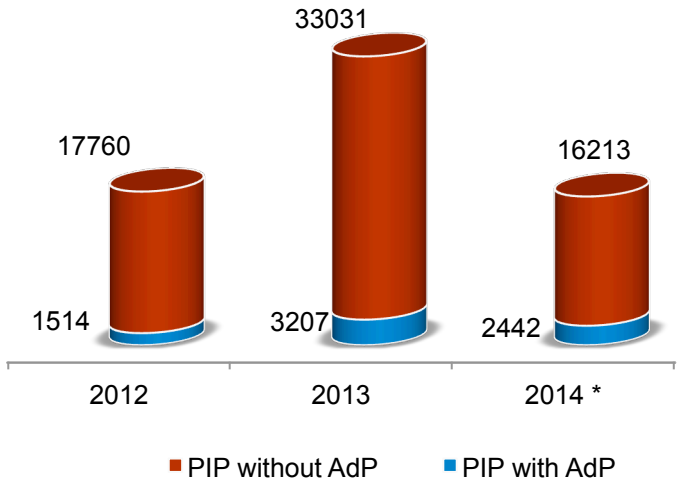
The systematization of the sample of feasible pre-investment studies between 2009 and 2011 in the regional governments of Cusco and Piura, conducted by the IPACC BMUB/GIZ project (2014), indicates a greater development of RM compared to the results obtained by feasibility assessments conducted in 2007. In this case, RAs prioritize "hazard identification" (61% of PIPs in Piura and 58% in Cusco identified hazards), "PU vulnerability analysis" (32% of PIPs in Piura and 36% in Cusco) and, to a lesser extent, the identification of risk reduction measures (35% of PIPs in Piura, 23% in Cusco). In turn, there was little or poor incorporation of the

[10] The percentage is under revision at time of publication

issues associated with social costs and social evaluation of measures in this sample. The overall results of RA and DRM mainstreaming are presented in Annex 1.

The information recorded in the SNIP Project Bank —SNIP Form 03—, for the period 2012-2014, indicates that the percentage of feasible PIPs (as per total investment in USD millions) registering “hazards identified in the area of the PIP” has increased from 8% in 2012 to 13% in 2014 (Figure 15 ()). This would indicate that hazard analysis is increasingly taken into account during project formulation.

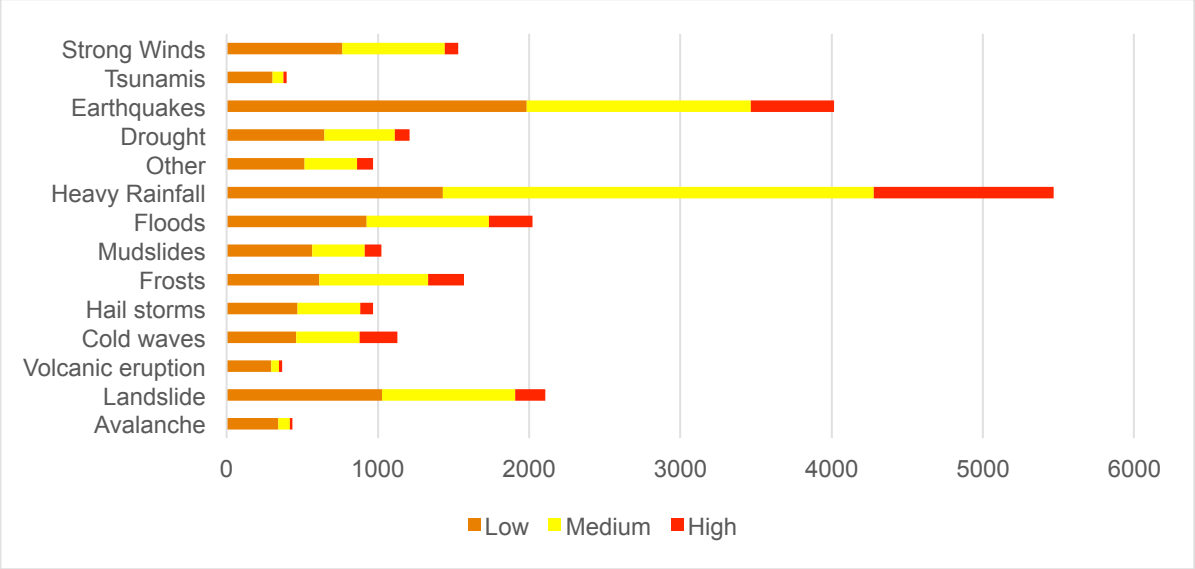
Figure 15: Viable projects with/without hazard analysis (USD millions and %)



Note: 2014 includes data by 30 November.
Source: SNIP Project Bank

Based on the information provided by the projects that record hazards, it may be observed that some hazards are more recurrent or relevant in terms of the problems they cause and their solutions. It is especially noteworthy that “heavy rain” and “earthquakes” are the most frequently mentioned and characterized in risk analyses (Figure 16).

Figure 16: Main hazards identified in feasible PIPs, Apr 2011 - Nov



Source: SNIP Project Bank.

The other issue that can be monitored from the record sheets -SNIP Form 03- is the “investment cost associated with DRR measures,” which must be entered by the formulator after indicating potential hazard(s) to the project. In this regard, the number of record sheets that report on the costs of DRR measures was lower than those indicating relevant hazards.

The reasons for this difference between projects with or without indicated measures and costs could be explained by: a) the existence of hazards such as earthquakes that DO NOT require the identification of costs —this hazard only requires compliance with seismic rules—; b) low relevance or magnitude of hazards identified, therefore, no action is required; c) ignorance or carelessness on the part of those responsible for completing record sheets with this information, more so when leaving cost information blank does not prevent completion of the other questions in the sheet. A review of the projects showed that while pre-investment studies had significant amounts for investment in risk reduction measures, the SNIP Form 03 did not contain this information.

The following table presents the projects that registered investment costs of the measures categorized by sectors. These costs represent approximately 6% of the total investment. In terms of DRR investment, defence, public order and safety sector, transport and communications sector, education, culture and sport sector, and sanitation, housing and development sector are significant investors. The defence, public order and safety sector has the highest percentage of investment in risk reduction measures (27.9%). The figures shown in Table 4 may be higher in practice.

Table 4: Total investments and DRR Investment per sector, Apr 2011 Nov 2014

Sectors	Investment (USD millions)	Investment in DRR measures (millions USD)	%
Defence, public order and safety	472	132	27.9
Education, culture and sport	1338	75	5.6
Social protection	53	3	6.1
Sanitation, housing and development	1336	64	4.8
Commerce, industry, fisheries and tourism	214	14	6.6
Justice, planning, contingency	322	13	4.2
Environment	200	7	3.7
Agricultural and farming	1047	31	2.9
Health	423	5	1.3
Transport and communications	2029	124	6.1
Energy	98	1	0.6
Total	**7532**	**470**	**6.2**

Source: SNIP Project Bank.

4. Methodological tools of public investment

The development of the regulatory framework presented in the previous chapter is accompanied by a set of methodological tools — generally reference documents to guide formulators and evaluators in understanding and applying risk analysis and management in public investment—. The methodological tools are available on the SNIP website and may be classified into the following categories:

- Specific and/or general guidelines
- Conceptual documents and applications
- Specific minimum contents
- Methodological guidelines
- Methodological guides

Here are the instruments that provide guidance on the methodological steps for risk management issues in the context of climate change, by category of instrument.

4.1. General Guidelines

a. PIP Guidelines including a disaster risk prevention and mitigation approach

These guidelines recognize the new legal framework based on the creation of SINAGERD and its implications for PIPs. In addition, the guidelines define the concept of mainstreaming disaster risk prevention and mitigation in PIPs.

b. Guidelines for mainstreaming DRM in a context of CC measures in Tourism PIPs

These guidelines are part of the annexes to the “Guide to produce PIP studies in the tourism sector” and are divided into one general and 3 specific guidelines (nature tourism in highland jungle, cultural heritage tourism in highland jungle and mountains, and sun and beach tourism in the north).

The guidelines orient the integration of risk reduction measures in the context of climate change, which complements analysis and risk management already being developed in the tourism sector.

4.2. Conceptual documents and applications

c. Concepts associated with DRM in the context of climate change: contributions in support of public investment

This document conceptualizes risk management in the context of climate change for PIP cycle phases. Furthermore, it updates the definitions of disaster risk factors such as hazard, exposure and vulnerability, and recognizes that changes in climate variability and averages can modify key elements in PIPs such as supply, demand and expected benefits.

d. Evaluation of the social profitability of DRR measures in PIPs

This document explores the steps to be followed to estimate the social benefits and costs of risk reduction measures, in order to evaluate them socially. It contains a systematization of case studies in sanitation, agriculture, health and energy.

e. SNIP and climate change: an estimate of the costs and benefits of implementing risk reduction measures

This publication recognizes the relationship between the effects of climate change and disaster risk. It contributes new examples of how to conduct social evaluation of risk reduction measures for agriculture, energy, sanitation and transportation.

4.3. Specific minimum contents

f. Specific minimum content (SMC) for PIP pre-investment studies of post-disaster service recovery

When a PU has been affected by a hazard and, as a consequence, the national government or private individuals declare the state of disaster, PIPs are developed to recover the production capacity of goods and/or services provided by such PU. In this sense, SMCs develop the topics that should be addressed by these types of pre-investment initiatives and the preconditions that must be met, for example, the emergency declaration.

4.4. Specific methodological guidelines

g. Methodological guidelines for mainstreaming disaster risk analysis in PIPs

These guidelines include practical guidance on how to perform the analysis of hazards, exposure and vulnerability in the formulation of PIPs and considerations for evaluating risk reduction measures.

Due to recent regulatory changes in the country, the approach and concepts of this document and other methodological tools need to be updated —an effort already undertaken by the MEF— and therefore should be used only as a reference.

h. General guide for the identification, formulation and social evaluation of public investment projects, profile level

This guide is a reference document for all types of services and/or goods addressed by PIPs; it contains the methodological steps of all the issues raised in SNIP Annex 05 (General minimum contents) including risk management in the context of climate change. This document is an updated version and replaces the Guidelines for identification, formulation and social evaluation of PIPs at profile level approved in 2011.

i. Guide to the identification, formulation and social evaluation of PIPs for PU protection against floods, at profile level

This guide outlines the basic concepts and contents that should be considered when developing a profile-level pre-investment study on PU protection services against floods. It recognizes that climate change increases uncertainty in terms of the occurrence of physical phenomena such as floods.

In protection PIPs, 100% of the actions will be flood risk reduction measures; however, the analysis is not limited to flooding as it should be known and assessed whether there are other dangers that could affect the protection services provided by the PIP (for example if the area is prone to earthquakes), so as to implement the corresponding risk management efforts.

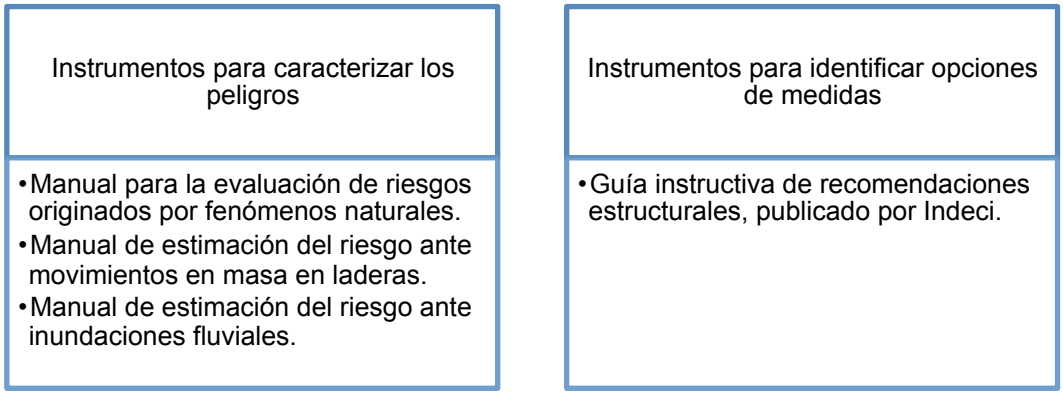
j. Sectoral guides on irrigation, health, education, among others, from a RM approach

Most sectors that receive public investment also have a sector-specific guide for the development of pre-investment studies, which include risk analysis and management as a crosscutting topic. At the date of preparation of this document, these guides were still pending an update in order to meet the new minimum contents (SNIP Annex 05).

4.5. Other instruments available

Along with the methodological tools available in the SNIP, formulators and evaluators may also use other official references prepared and published by CENEPRED and INDECI to improve risk analysis and management in PIPs.

Figure 17: Instruments published by Cenepred and INDECI



Source:Cenepred and Indeci

Although the documents listed in Figure 16 have not necessarily been prepared only for the practitioners who formulate or evaluate PIPs, some of their contents may be useful to advance DRM mainstreaming. Manuals for example, help in hazard characterization thus improving hazard analysis in the study area of a particular PIP and/or identification of areas of impact. The guide also shows examples of low-cost and non-complex structural works executed in Peru and other countries in the region, categorized by hazard and vulnerability. This provides technical elements to propose different risk reduction actions or measures in pre-investment studies.

5. Contingency finance mechanism

When a disaster strikes, PUs of goods and services that have been affected may also access resources from the **Contingency Reserve** as an instrument of financial protection. In 2014, US$ 17.8 million[11] of this fund was allocated by Law 30115, which also exempts "the declaration of viability" and authorizes the MEF to apply a simplified procedure to determine the eligibility of the "emergency in the event of a disaster.

These contingency resources, under the responsibility of INDECI, enable rehabilitation actions to recover the provision of interrupted services in the short and temporary term, as well as decrease the likely damage of an impending impact of a natural or man-made phenomenon. The statement of emergency must be determined by the technical-scientific public body concerned (imminent danger), whose requirements are set out in Guideline No. 003-2013-EF/63.0 (presented in the section on the legislative level).

The **Fiscal Stabilization Fund** (FEF) and **contingent financing** are also available for these emergencies. In 2013, the FEF —funds from annual tax savings— had US$ 3,448 million[12] for major disasters (UN, 2014). The contingent financing procedure is approved by the Law on Domestic Debt, whose amounts for 2013 and 2014 are shown in Table 5. It is estimated that the contingent financing may be slightly higher by 2015 (UN, 2014).

Table 5: Stand-by-loans by creditor. Period: 2013-2014

Year	Amount US $ (million)	Creditor
2013	300	Development Bank of Latin America (CAF)
2014	300	Inter-American Development Bank (IDB)
	100	Japan International Cooperation Agency (JICA)

Source: Statistics of the Directorate General of Public Debt and Treasury-MEF and MEF press releases.

[11] Equivalent to S/. 50 million at an exchange rate of 2.9.
[12] Equivalent to S/.10.000 million, at an exchange rate of 2.9.

6. Information systems and tools

Risk management requires information for decision-making, for example, primary and secondary information to characterize the hazard and its impact areas and determine whether a PU or PIP is exposed, as well as its levels of vulnerability (fragility and resilience).

SNIP has made efforts to collect and make useful risk management information available for formulators and evaluators. In the medium term, the establishment of a geographic information platform with the capacity for data storage (hazard maps, climate scenarios, geo-referenced projects, among others) with standardized graphical layers is expected (Sanchez, 2014). In 2013, a CD-ROM with interactive information for SNIP operators was developed and has been disseminated through training workshops.

In addition, SINAGERD, through its institutions INDECI and CENEPRED, collects probabilistic information on climatic, geological and geodynamic events from source entities and makes them available in their information systems[13] (SINPAD and SIGRID, respectively). This data could also contribute to the construction of better project assessments and knowledge to manage risk within those projects. Finally, like many countries around the world, Peru has a historical inventory of disasters through the Inventory System of the Effects of Disasters (Desinventar).

The contents and applications for SNIP operators of the aforementioned databases are detailed below.

6.1. Hazard map and climate scenarios, interactive version

Faced with the problem that the information in the country is scattered in the various public entities that are responsible for its production and that it requires additional time to access, hazard maps and climate scenarios were systematized for interactive use through the free application *Arc Reader* in 2013.

This work was performed with information about "hazards" provided by the Multisectoral Committee for Risk Reduction in Development (CMRRD)[14] and MINAM and updated to 2012. In addition, there is information on the spatial location of PIPs related to education, health, irrigation, sanitation and emergency services. There is also information on "climate scenarios" at the national level and for the regions of Cusco and Apurimac, provided by MINAM and SENAMHI.

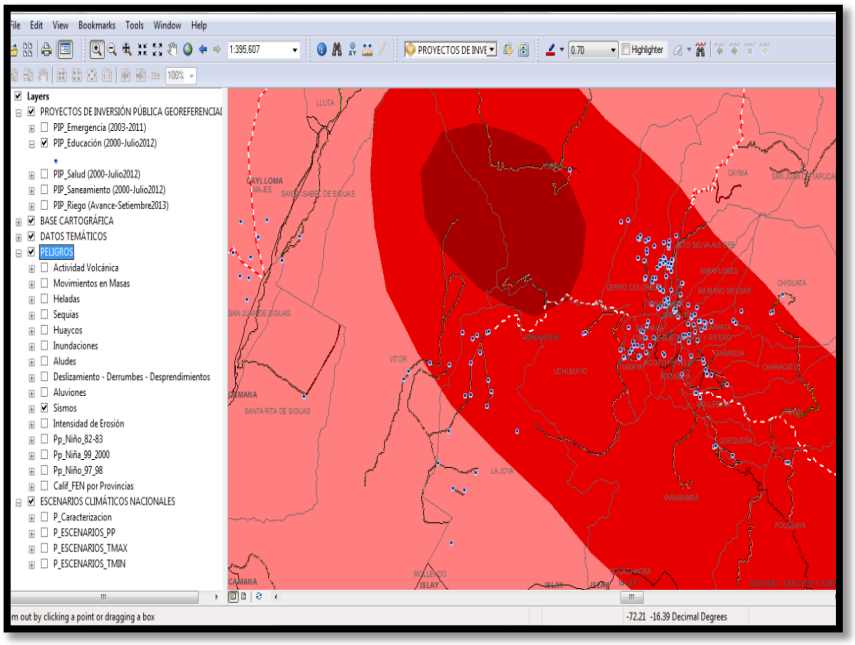
Interactive maps include the following categories: 1) geo-referenced location of PIPs; 2) cartographic base and thematic data; 3) hazards; 4) climate scenarios at the national level (period 2020-2030); and 5) climate scenarios for Cusco and Apurimac. Annex 2 lists the literature and resources available on the CD.

The layered information is easily accessible and makes it possible, for example, to overlay maps to visualize exposure in hazardous areas of geo-referenced PIPs and propose locations for new or expanded PIPs. The maps related to climate scenarios represent technical approaches to future climate conditions (temperature and precipitation) that can be used as a reference by PIP formulators in the analysis of risks associated with changes in climate averages, variability and extremes. An example of the information available and its potential uses is presented below.

[13] These systems are currently being implemented; reducing potential duplication of work and information requested from the institutions remains one of the challenges (UN, 2014).
[14] The CMRRD was created by Supreme Decree No. 053-2002-PCM in 2002.

The red hues in the map below represent seismic hazard information and peak intensities in the districts of La Joya and Uchumayo, Arequipa (Figure 18). The blue dots show the location of educational institutions, geo-referenced up until 2012 in the area. This information should be taken into account in the formulation of new and/or improvement of current educational facilities, in order to include earthquake risk reduction measures.

Figure 18: Seismic map and education PIPs, Arequipa



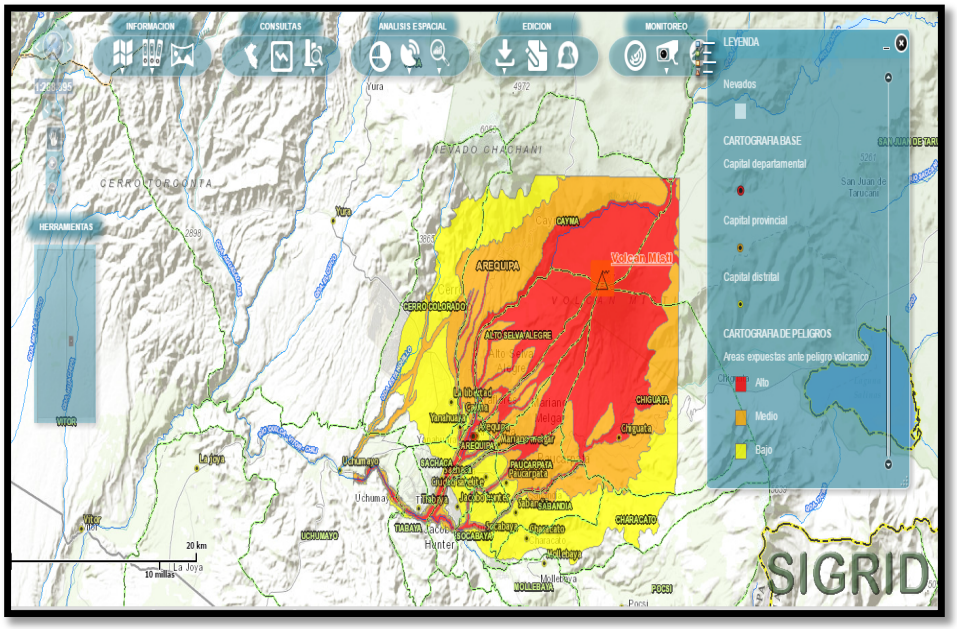
6.2. Information System for Disaster Risk Management (SIGRID)

SIGRID is the official database of CENEPRED. It structures and systematizes geospatial and administrative information on DRM produced by various technical and scientific institutions. Regional and municipal governments may use this information to develop baselines and assessments of their respective territories (CENEPRED, n.d.).

In this case, information layers include: 1) base geography, 2) exposed elements; 3) information produced by CENEPRED such as risk scenarios for El Niño; 4) risk mapping; 5) vulnerability mapping; 6) hazard mapping; and, 7) thematic mapping. This information is available at: <http://sigrid.cenepred.gob.pe/sigrid/>.

Given the risk analysis methodology developed by PIPs in the framework of SNIP, the SIGRID layer that refers to the hazards is especially important, because it makes it possible to analyse whether a PIP study area is located within the area of impact of a specific hazard. The following illustration shows the volcanic hazard observed in the city of Arequipa, southern Peru, where red indicates areas considered at 'high' risk of volcanic hazard (Figure 19). Therefore, PIPs located in those areas should manage risk.

Figure 19: Topographic map with the areas exposed to volcanic hazard in the city of Arequipa, Peru



6.3. National Information System for Response and Rehabilitation (SINPAD).

SINPAD is a computer system that provides emergency records for hazards and major damage, and is administered by INDECI. The information enables the collection of statistics on events and damage, as well as emergency cards with the description of damage assessment and actions. This information is available at: <http://sinpad.indeci.gob.pe/PortalSINPAD/>.

Figure 20 illustrates an example on an emergency card for “flooding due to the overflow of the Acre River” in the town of Itapari, Iñapari district, province of Tahuamanu in the region of Madre de Dios.

Figure 20: Emergency card for flooding due to the overflow of the Acre River, Madre de Dios

29/11/2014 Instituto Nacional de Defensa Ci

Estado Situacional de la Emergencia

EMERGENCIA

INUNDACION DESBORDE DE RIO ACRE (00067688)

Grupo Fenómeno	METEOROLOGICOS, OCEANOGRAFICOS	Fecha	28/11/2014 10:00:00
Fenómeno	INUNDACION	Fuente	JEFE PNP
Latitud y Longitud	-10,94478 Longitud -69,58057	Usuario	CVIRTUAL.MDDIOS02

INFORME PRELIMINAR

Hechos	EL RIO ACRE DESBORDO TRAENDO COMO CONSECUENCIA LA INUNDACION EN EL CENTRO POBLADO DE IÑAPARI
Daños	VIVIENDAS INAVITABLES 40 VIVIENDAS AFECTADAS 80 INSTITUCIOINES EDUCATIVAS 02 CARTRETERA AFECTADAS 0.7
Acciones	EL ALCALDE PROVINCIAL Y LA PNP, SE PRESENTARON A REALIZAR Y VERIFICAR LOS DAÑOS OCASIONADOS POR LA INUNDACION PLUVIAL.

ZONAS AFECTADAS

Región	Provincia	Distrito	Localidad
MADRE DE DIOS	TAHUAMANU	IÑAPARI	I?APARI

EVALUACION DE DAÑOS GENERAL | Mas Detalle |

Grpo.Daño	Daño	Cantidad	Und.Med.
VIDA Y SALUD (PERSONAS)	DAMNIFICADOS	280.00	PERSONAS
VIVIENDAS Y LOCALES PUBLICOS	INSTITUCIONES EDUCATIVAS AFECTADAS	2.00	UNIDAD
VIDA Y SALUD (PERSONAS)	AFECTADOS	80.00	PERSONAS
VIVIENDAS Y LOCALES PUBLICOS	VIVIENDAS INHABITABLES	40.00	UNIDAD
TRANSPORTES	CARRETERAS AFECTADAS	0.70	KILOMETROS

ACCIONES REALIZADAS

Dpto.	Prov.	Dist.	Localidad
MADRE DE DIOS	TAHUAMANU	IÑAPARI	I?APARI

28/11/2014 - 11:00:00 : DOS CENTROS EDUCATIVOS SE ENUENTRAN INAVITABLES, EL SECTOR CORRESPONDIENTE ESTA TOMANDO LAS ACCIONES PERTINENTES EL SECTOR TRANSPORTE SE ENCUENTRAN REALIZABDIO LOS TRABAJOS DE REHABILITACION

REQUERIMIENTO DE ATENCIÓN

Item N°	Artículo / Bien	Cantidad	Und.Med
ABRIGO			
1	CAMA PLEGABLE DE 1 PLAZA	280	UNIDAD
2	COLCHON DE ESPUMA DE 1 PLAZA 2 1/2 PULG	280	UNIDAD
3	COLCHON DE ESPUMA DE 3/4 DE PLAZA X 2 1/2 PULG.	280	UNIDAD
4	FRAZADA DE 1 1/2 PLAZA	280	UNIDAD
ALIMENTO			
5	OLLA DE ALUMINIO N° 26	40	UNIDAD
6	PLATO HONDO DE PLASTICO	280	UNIDAD
7	PLATO TENDIDO DE PLASTICO	280	UNIDAD
8	VASO DE PLASTICO	280	UNIDAD
9	CUCHARA PARA SOPA	280	UNIDAD
10	CUCHARON DE ALUMINIO GRANDE	40	UNIDAD
TECHO			
11	CARPA FAMILIAR (5 PERSONAS)	40	UNIDAD
12	CALAMINA GALVANIZAD0 CORRUGADO 1.8 MTS. PNUD	600	UNIDAD

APOYO HUMANITARIO

Item N°	Artículo / Bien	Cantidad	Und.Med
1	CARPA VERDE 05 PERSONAS DE 10M2	40	UNIDAD
2	COLCHON DE 1 PLAZA	280	UNIDAD
3	CUCHARA PARA SOPA	280	UNIDAD
4	CUCHARON DE ALUMINIO N° 12	40	UNIDAD
5	FRAZADA DE 1 1/2 PLAZA (PNUD)	280	UNIDAD
6	OLLA DE ALUMINIO N° 26	40	UNIDAD
7	PLATO DE PLASTICO HONDO	280	UNIDAD
8	PLATO DE PLASTICO TENDIDO	280	UNIDAD
9	TACHO PVC DE 30 GLN COLOR PLOMO	20	UNIDAD

Total Ayuda en TM 3,0862

Fecha y Hora de Reporte 29/11/2014 15:31:10

Imprimir

Both emergency cards and consolidated statistics are

important elements to consider when assessing project risks. Emergency cards make it possible to verify whether there is a history of disasters in the project study area for a particular hazard, which could occur again within the time horizon of the project. This information helps to analyse potential damage and losses, i.e., to quantify the risk attributable to a particular project, which will ultimately allow for the social evaluation of risk reduction measures proposed during the development of the pre-investment study.

7. Inventory System of the Effects of Disasters (Desinventar), Peru

Desinventar's conceptual and methodological tools enable the construction of disaster databases at the local-municipal level. The database was built by the pilot project called La RED. It is not part of the SINPAD, and from 2010 it is updated by PREDES (a Peruvian NGO). The databases are accessed through a software with options for maps, Figures and data. This information is available at:

<http://online.desinventar.org/desinventar/#PER-1250695241-peru_inventario_historico_de_desastres>.

The example below (Figure 21) illustrates the data that can be obtained through Desinventar for floods in the district of Iñapari, province of Tahuamanu, region of Madre de Dios. Three events associated with the flooding of the Acre River are recorded, with associated damage and losses.

Figure 21: Flooding since 1979 in the district of Iñapari, province of Tahuamanu, region of Madre de Dios, Peru

Fila	Serial	Fecha Inicio	Tipo de evento	Nombre Geografía	Sitio	Fuentes	Observaciones de efectos	Muertos	Desaparecidos	Heridos; enfermos	Damnificados	Afectados	Evacuados	Reubi
1	810 205	1981-03-04	Inundación	MADRE DE DIOS/TAHUAMANU/IÑAPARI		EL C. 07.03.81	G.: ...desesperadamente contra el desborde de los ríos Avre y Yaverija. A.: Destrucción de	0	0	0	0	0	0	
2	40 234	2004-02-12	Inundación	MADRE DE DIOS/TAHUAMANU/IÑAPARI	ríos Acre y Yaverija	E.C.13/02/2004		0	0	0	0	0	0	
3	2012-00131	2012-02-16	Inundación	MADRE DE DIOS/TAHUAMANU/IÑAPARI		EIC 18.02.12	El sistema de agua y desagüe colapsó	0	0	15	☑	4 214	☑	

For SINPAD, the information obtained from Desinventar databases is useful in the risk analysis of pre-investment studies, especially in gathering background data on hazards and risk estimates, necessary to suggest risk reduction measures and their social assessment.

Conclusions

1. Peru has a set of legal, methodological and budgetary instruments that fosters the mainstreaming of DRM and CCA in the cycle of PIPs. In particular, these instruments are mutually reinforcing since mid-2011 with the creation of SINAGERD and, in 2013, the inter-agency efforts between the MEF and MINAM on the adjustments to the context of climate change.

2. Although it is still soon to suggest impact evaluations of the implementation of the instruments, it is important to conduct an ongoing and systematic monitoring of progress by sector, by type of PIP or by risk. This will help identify constraints and developments that will improve the overall process. SNIP already has a tool that supports monitoring —SNIP Form 03—, although the context of climate change is not automatically identifiable in the current version. It is worth noting that the statistics obtained from this form up until November 2014 and presented in this document may be overestimate of the progress since cases were detected where, although the PIP identified hazards and measures, operators did not report them when filling the form.

3. The Chapter 3 highlighted that DRR/DRM mainstreaming process in PIP began in 2007, in practice with little or no incorporation of hazard analysis in the study area. Hazard analysis has since been gradually included in PIP formulation —an increase from 8% in 2012 to 13% in 2014 can be observed in terms of amount of investment—, along with the further development of tools and training.

   Improvements can also be observed in the risk management index (RMI) which is being monitored by IDB in the areas of risk identification, risk reduction, disaster management and financial protection for 2008 and 2014.

4. Information systems and tools help solve the issue of dispersed and scarcely available information. In the case of PIPs, hazard maps and/or data on disasters (damage and losses incurred) are especially useful as inputs for risk analysis —they analyse risks and identify hazards—. A remaining challenge is the availability of appropriately scaled maps for the project study areas, historical data to better establish future risk scenarios and data to determine the magnitude and intensity of potential hazards.

5. Another challenge is to have more integrated information systems that facilitate research and do not duplicate the work of the formulators. In particular, the CD with the hazard maps and climate scenarios is an example of an initial effort towards this integration. However, this tool needs to be supplemented with a detailed implementation manual. Regarding geo-referenced projects, it is necessary to expand the information on spatial location, which is currently available only to 2013 and for 4 types of projects.

   It should be taken into account that a PU or PIP risk analysis must always be complemented with information collected in the field, secondary documentation, local knowledge, the expertise of technicians, among others; in order to inform the findings on the exposure, fragility and resilience levels of PUs and PIPs.

6. Statistics suggest the increasing tendency of the number of PIPs that consider hazards in the analysis and mainstream risk management measures in general. However, it is still necessary to accurately understand the sources of information used by the formulators, how the level of exposure and vulnerability of PUs/PIPs is determined, the extent to which risk reduction measures are considered in social evaluation, among others. A case study may provide a deeper understanding of these issues and inform reflection on the limitations, if any, of the formulators and evaluators. This could contribute to the construction of new legal, financial, methodological and information instruments.

7. Statistics of Chapter 3 also revealed the challenge that cost information of DRR is often not reported. Without record of cost information, it would be difficult to implement economic analysis such as cost benefit analysis. Cost information should be systematically collected.

8. As seen in the above missing information such as hazard and cost information, the legal and regulatory progress in Peru seems to focus on *process* of investment decision making and not fully monitor the degree the required study is implemented in practice. In their SNIP, project formulation and execution is implemented by sectoral ministries and regional/local governments. It is important to raise awareness of those sectoral ministries and regional/local governments to fully implement requirements stipulated in the law and regulation. This is more so for regional/local governments under on-going decentralization trends. Regular check of quality of feasibly report and SNIP Form 03 by MFE, though not necessarily for all projects, is also recommended.

References

Cenepred. s/f. *Manual del usuario SIGRID* [Versión Digital PDF]. Disponible en <http://sigrid.cenepred.gob.pe/sigrid/>.

DGPM-MEF. 2007. *Conceptos asociados a la gestión del riesgo de desastres en la planficación e inversión para el desarrollo*. Documento 1, Serie Sistema Nacional de Inversión Pública y la Gestión del Riesgo de Desastres. Lima: Dirección General de Programación Multianual del Ministerio de Economía y Finanzas (DGPM-MEF).

DGPI-MEF. 2013a. *Conceptos asociados a la gestión del riesgo en un contexto de cambio climático: aportes en apoyo de la inversión pública para el desarrollo sostenible*. Documento 6, Serie: Sistema Nacional de Inversión Pública y la Gestión del Riesgo de Desastres. Lima: Dirección General de Política de Inversiones del Ministerio de Economía y Finanzas (DGPI-MEF).

DGPI-MEF. 2013b. *Mapas de peligros y escenarios climáticos*. Serie: Sistema Nacional de Inversión Pública y la Gestión del Riesgo de Desastres [versión CD]. Lima: Dirección General de Política de Inversiones del Ministerio de Economía y Finanzas (DGPI-MEF).

Ferro, V. 17 de julio de 2014. La gestión del riesgo de desastres como gestión por resultados en el Perú. En *Incorporación de la Adaptación al Cambio Climático en la Inversión Pública, caso peruano*. Taller Internacional realizado en Lima, Perú.

Gobierno Regional Piura. 2013. *Estrategia Regional de Cambio Climático – Piura* [Versión PDF]. Piura: Gobierno Regional Piura.

IPACC BMUB/GIZ. 2014. *Informe final*: *Evaluación y sistematización de la incorporación del análisis y la gestión del riesgo en los proyectos de inversión pública en Piura y Cusco.* Proyecto Inversión Pública y Adaptación al Cambio Climático (IPACC BMUB/GIZ).

Lavell, A. 2013. *La adaptación al cambio climático y la gestión del riesgo: reflexiones e implicancias*. Segunda Edición. Lima: Proyecto Inversión Pública y Adaptación al Cambio Climático-GIZ/Flacso/Minam/Cenepred.

Lavell, A. 2014. *Reducción del riesgo de desastres y decisiones de inversión pública: el caso peruano*. [Versión Digital PDF]. Lima: Proyecto Inversión Pública y Adaptación al Cambio Climático (BMUB/GIZ) / Flacso.

MEF. s/f. *Resultados de la evaluación de las Declaratorias de Viabilidad otorgadas por los órganos competentes del Gobierno Nacional, Gobiernos Regionales y Gobiernos Locales en el año 2007, en el marco del Sistema Nacional de Inversión Pública.* Disponible en <http://www.mef.gob.pe/contenidos/inv_publica/docs/estudios_documentos/estudios/Informe_de_Resultados_Viabilidades_2007_Vf.pdf>.

MEF y JICA. 2012. *Pautas Generales para la Evaluación Ex Post de Proyectos de Inversión Pública* [Versión Digital PDF]. Lima: Ministerio de Economía y Finanzas (MEF) y Agencia de Cooperación Internacional del Japón (JICA).

MEF. 2013a. *Conceptos asociados a la gestión del riesgo en un contexto de cambio climático: aportes en apoyo de la inversión pública para el desarrollo sostenible*. Documento 6, Serie Sistema Nacional de Inversión Pública y la Gestión del Riesgo de Desastres. Lima: DGPI-MEF.

MEF. 2013b. Foniprel incentiva la gestión del riesgo en la inversión pública. *Boletín Política de Inversiones, BIP 10, p.7*. Disponible en: <http://www.ipacc.pe/doc/boletin_snip.pdf>.

MEF. 2014. *Guía general para identificación, formulación y evaluación social de proyectos de inversión pública, a nivel perfil* [Versión Digital PDF]. Lima: Ministerio de Economía y Finanzas (MEF).

Naciones Unidas. 2014. *Análisis de la implementación de la Gestión del Riesgo de Desastres en el Perú*. Lima: Naciones Unidas.

Sanchez, G. 17 de julio de 2014. El CD interactivo del MEF con mapas de peligro y escenarios climáticos. En *Incorporación de la Adaptación al Cambio Climático en la Inversión Pública, caso peruano*. Taller Internacional realizado en Lima, Perú.

Seguimiento de la Ejecución Presupuestal, Consulta Amigable [Base de datos]. 23 de noviembre de 2014. Disponible en <http://apps5.mineco.gob.pe/transparencia/Navegador/default.aspx>.

Annex 1. Thematic assessment of feasible PIPs in Piura and Cusco

The variables that were evaluated in the projects are presented below. The column of 'representation' is the percentage of PIPs that include the information presented in the third column. Cusco seems to be relatively more progressed in risk analysis while Piura shows more progress in social assessment.

Module	Subtopic	Variables	Representation (%) Piura	Cusco
General aspects	1	Problems and interests perceived groups related to MRRDs, identified	12 %	11 %
		Strategies to address the interests of stakeholders and agreements and commitments related to MRRDs, identified	4 %	2 %
Identification	2	Background include information on risks	39 %	30 %
	3	Existing dangers and their characteristics including severity and frequency, identified	61 %	58 %
	4	The most relevant hazards to which PUs are exposed, analyzed (when the PU exists)	11 %	23 %
		PU vulnerability, analyzed (when the UP exists)	32 %	17 %
		Damage and probable losses that the impact of identified hazards may cause on the PU, evaluated	9 %	9 %
		MRRDs planned within the approach of alternative solutions, when risks are identified	28 %	15 %
Formulation	5	Potential conditions of vulnerability of the PIP, analyzed: exposure, fragility and resilience	15 %	36 %
		PIP level of vulnerability, identified (low, medium or high)	4 %	17 %
	6	Level of risk associated with the project, identified	2 %	21 %
	7	Structural and nonstructural MRRDs, considered when there is risk associated	35 %	23 %
	8	MRRD investment costs at market, prices estimated	26 %	23 %
		O & M costs of MRRDs at market prices, estimated	8 %	4 %
Evaluation	9	Incremental social assessment of risk reduction measures, conducted	8 %	8 %
		Social evaluation of project alternatives including MRRDs, conducted	24 %	19 %
	10	Analysis of project sensitivity to changes in variables related to risk situations, conducted	15 %	2 %

Source: IPACC BMUB/GIZ.

Annex 2. References and resources available in Hazard maps climate scenarios. Series: National Public Investment and Disaster Risk Management System (DGPI-MEF, 2013b)[15]

1. FOLDER: GEOREFERENCED PUBLIC INVESTMENT PROJECTS

Map	Source
PIP Emergency (2003-2011)	Ministry of Economy and Finance (2012)
PIP Education (2000 to July 2012)	Ministry of Economy and Finance (2012)
PIP Health (2000 to July 2012)	Ministry of Economy and Finance (2012)
PIP Sanitation (2000 to July 2012)	Ministry of Economy and Finance (2012)
PIP Irrigation (2000 to September 2013)	Ministry of Economy and Finance (2013)

2. FOLDER: BASE MAPPING

MAP	SOURCE
Mesh	ESRI
Population centers	National Geographic Institute (2005)
Department capital	National Geographic Institute (2005)
Province capital	National Geographic Institute (2005)
District capital	National Geographic Institute (2005)
Departments	National Geographic Institute (2005)
Provinces	National Geographic Institute (2005)
Districts	National Geographic Institute (2005)
Rivers	National Geographic Institute (2005)
Lakes	National Geographic Institute (2005)
Islands	National Geographic Institute (2005)
Major rivers	National Geographic Institute (2005)
Secondary rivers	National Geographic Institute (2005)
Basins	National Geographic Institute (2005)
Educational offer	Ministry of Education (2005)
Health facilities	Ministry of Health (2005)
Ports	Ministry of Transport (2005)
Bridges	Ministry of Transport (2005)
National Network	Ministry of Transport (2005)
Departmental network	Ministry of Transport (2005)
Neighborhood Network	Ministry of Transport (2005)
Rail network	Ministry of Transport (2005)
Electric Concessions	Ministry of Energy and Mines (2012)
Camisea Pipeline	Ministry of Transport (2003)
Nor Peruano pipeline	Ministry of Transport (2003)

3. FOLDER: THEMATIC DATA

MAP	SOURCE
Fragile ecosystems (swamp, bog, glaciers, lakes, reservoirs and rivers)	SERNANP, MINISTRY OF ENVIRONMENT (2006)
Protected areas	SERNANP, MINISTRY OF ENVIRONMENT (2006)
Buffer zone	SERNANP, MINISTRY OF ENVIRONMENT (2006)
Deforestation area	Ministry of Environment (2000)

[15] The tables belong to the document 'Index of Hazard Maps Climate Scenarios' in the CD-rom.

4. FOLDER: HAZARDS

MAP	SOURCE
Volcanic activity	Geological Mining and Metallurgical Institute (2006)
Landslide-types: fall, slip, flow, complex motion, creeping, rollover and other hazards	Geological Mining and Metallurgical Institute (2009)
Frost	National Service of Meteorology and Hydrology (2003)
Drought - affected areas by recurrent droughts	National Institution of Planning (2003) With drought data of 1983
Alluvium	Geological Mining and Metallurgical Institute (2003)
Floods	Geological Mining and Metallurgical Institute (2003)
Avalanches	Geological Mining and Metallurgical Institute (2003)
landslip, landslides	Geological Mining and Metallurgical Institute (2003)
Downpour	Geological Mining and Metallurgical Institute (2003)
Seismic accelerations	Geophysical Institute of Peru (2003)
Seismic Events	Geophysical Institute of Peru (2003)
Maximum seismic intensity	Geophysical Institute of Peru (2003)
Erosion intensity	Geological Mining and Metallurgical Institute (2003)
Rainfall El Niño 1981-1982	National Service of Meteorology and Hydrology (2003)
Rainfall La Niña 1999-2000	National Service of Meteorology and Hydrology (2003)
Rainfall El Niño 1997-1998	National Service of Meteorology and Hydrology (2003)
Rating of provinces by levels of risk associated with heavy rains caused by ENSO	Data on climatic variations ENSO-CAF 97-98 (2003)

5. FOLDER: NATIONAL CLIMATE SCENARIOS

MAP	SOURCE
Characterization	
PP_total_Multianual	National Service of Meteorology and Hydrology (2009)
PP_promedio_MultiTrim_Verano	National Service of Meteorology and Hydrology (2009)
PP_promedio_MultiTrim_Otoño	National Service of Meteorology and Hydrology (2009)
PP_promedio_MultiTrim_Invierno	National Service of Meteorology and Hydrology (2009)
PP_promedio_MultiTrim_Primavera	National Service of Meteorology and Hydrology (2009)
Tmax_promedio_Multianual	National Service of Meteorology and Hydrology (2009)
Tmax_promedio_MultiTrim_Verano	National Service of Meteorology and Hydrology (2009)
Tmax_promedio_MultiTrim_Otoño	National Service of Meteorology and Hydrology (2009)

MAP	SOURCE
Tmax_promedio_MultiTrim_Invierno	National Service of Meteorology and Hydrology (2009)
Tmax_promedio_MultiTrim_Primavera	National Service of Meteorology and Hydrology (2009)
Tmin_promedio_Multianual	National Service of Meteorology and Hydrology (2009)
Tmin_promedio_MultiTrim_Verano	National Service of Meteorology and Hydrology (2009)
Tmin_promedio_MultiTrim_Otoño	National Service of Meteorology and Hydrology (2009)
Tmin_promedio_MultiTrim_Invierno	National Service of Meteorology and Hydrology (2009)
Tmin_promedio_MultiTrim_Primavera	National Service of Meteorology and Hydrology (2009)
Rainfall scenarios (PP)	
PP_ANUAL_2020	National Service of Meteorology and Hydrology (2009)
PP_VERANO_2020	National Service of Meteorology and Hydrology (2009)
PP_OTOÑO_2020	National Service of Meteorology and Hydrology (2009)
PP_INVIERNO_2020	National Service of Meteorology and Hydrology (2009)
PP_ANUAL_2030	National Service of Meteorology and Hydrology (2009)
PP_VERANO_2030	National Service of Meteorology and Hydrology (2009)
PP_OTOÑO_2030	National Service of Meteorology and Hydrology (2009)
PP_INVIERNO_2030	National Service of Meteorology and Hydrology (2009)
PP_PRIMAVERA_2030	National Service of Meteorology and Hydrology (2009)
VARIAC_PP_ANUAL_2030	National Service of Meteorology and Hydrology (2009)
Maximum temperature scenarios (TAMX)	
TMAX_ANUAL_2020	National Service of Meteorology and Hydrology (2009)
TMAX_VERANO_2020	National Service of Meteorology and Hydrology (2009)
TMAX_OTOÑO_2020	National Service of Meteorology and Hydrology (2009)
TMAX_INVIERNO_2020	National Service of Meteorology and Hydrology (2009)
TMAX_ANUAL_2030	National Service of Meteorology and Hydrology (2009)
TMAX_VERANO_2030	National Service of Meteorology and Hydrology (2009)
TAMX_OTOÑO_2030	National Service of Meteorology and Hydrology (2009)
TMAX_INVIERNO_2030	National Service of Meteorology and Hydrology (2009)
TMAX_PRIMAVERA_2030	National Service of Meteorology and Hydrology (2009)
VARIAC_TMAX_ANUAL_2030	National Service of Meteorology and Hydrology (2009)
Minimum temperature scenarios (TMIN)	
TMIN_ANUAL_2020	National Service of Meteorology and Hydrology

MAP	SOURCE
	(2009)
TMIN_VERANO_2020	National Service of Meteorology and Hydrology (2009)
TMIN_OTOÑO_2020	National Service of Meteorology and Hydrology (2009)
TMIN_INVIERNO_2020	National Service of Meteorology and Hydrology (2009)
TMIN_ANUAL_2030	National Service of Meteorology and Hydrology (2009)
TMIN_VERANO_2030	National Service of Meteorology and Hydrology (2009)
TMIN_OTOÑO_2030	National Service of Meteorology and Hydrology (2009)
TMIN_INVIERNO_2030	National Service of Meteorology and Hydrology (2009)
TMIN_PRIMAVERA_2030	National Service of Meteorology and Hydrology (2009)
VARIAC_TMIN_ANUAL_2030	National Service of Meteorology and Hydrology (2009)

6. CLIMATE SCENARIOS CUSCO-APURÍMAC

MAP	SOURCE
Climate data	
Estaciones_pp	National Service of Meteorology and Hydrology (2012)
Est_CuzApu	National Service of Meteorology and Hydrology (2012)
Characterization	
Pp_anual	National Service of Meteorology and Hydrology (2012)
Pp_def (December to January)	National Service of Meteorology and Hydrology (2012)
Pp_mam (March to May)	National Service of Meteorology and Hydrology (2012)
Pp_jja (June to August)	National Service of Meteorology and Hydrology (2012)
Pp_son (September to November)	National Service of Meteorology and Hydrology (2012)
Tmin_anual	National Service of Meteorology and Hydrology (2012)
Tmin_def (December to January)	National Service of Meteorology and Hydrology (2012)
Tmin_mam (March to May)	National Service of Meteorology and Hydrology (2012)
Tmin_jja (June to August)	National Service of Meteorology and Hydrology (2012)
Tmin_son (September to November)	National Service of Meteorology and Hydrology (2012)
Tmax_anual	National Service of Meteorology and Hydrology (2012)
Tmax_def (December to January)	National Service of Meteorology and Hydrology (2012)
Tmax_mam (March to May)	National Service of Meteorology and Hydrology (2012)
Tmax_jja (June to August)	National Service of Meteorology and Hydrology (2012)
Tmax_son (September to November)	National Service of Meteorology and Hydrology (2012)
Extreme events (C_eventos_extremos)	
d) PP_niño97_Multianual	National Service of Meteorology and Hydrology (2012)
e) PP_niño97_DEF (December to January)	National Service of Meteorology and Hydrology (2012)
f) PP_niño97_MAM (March to May)	National Service of Meteorology and Hydrology (2012)
g) PP_niño97_JJA (June to August)	National Service of Meteorology and Hydrology (2012)
h) PP_niño97_SON (September to November)	National Service of Meteorology and Hydrology (2012)
i) PP_niña99_Multianual	National Service of Meteorology and Hydrology (2012)
j) PP_niña99_DEF (December to January)	National Service of Meteorology and Hydrology (2012)
k) PP_niña99_MAM (March to May)	National Service of Meteorology and Hydrology (2012)
l) PP_niña99_JJA (June to August)	National Service of Meteorology and Hydrology (2012)
m) PP_niña99_SON (September to	National Service of Meteorology and Hydrology (2012)

MAP	SOURCE
November)	
Rainfall scenarios: changes by 2030	
Pp_anual	National Service of Meteorology and Hydrology (2012)
Pp_def (December to January)	National Service of Meteorology and Hydrology (2012)
Pp_mam (March to May)	National Service of Meteorology and Hydrology (2012)
Pp_jja (June to August)	National Service of Meteorology and Hydrology (2012)
Pp_son (September to November)	National Service of Meteorology and Hydrology (2012)
Minimum and maximum temperature scenarios: differences by 2030	
Tmin_anual	National Service of Meteorology and Hydrology (2012)
Tmin_def (December to February)	National Service of Meteorology and Hydrology (2012)
Tmin_mam (March to May)	National Service of Meteorology and Hydrology (2012)
Tmin_jja (June to August)	National Service of Meteorology and Hydrology (2012)
Tmin_son (September to November)	National Service of Meteorology and Hydrology (2012)
Tmax_anual	National Service of Meteorology and Hydrology (2012)
Tmax_def (December to February)	National Service of Meteorology and Hydrology (2012)
Tmax_mam (March to May)	National Service of Meteorology and Hydrology (2012)
Tmax_jja (June to August)	National Service of Meteorology and Hydrology (2012)
Tmax_son (September to November)	National Service of Meteorology and Hydrology (2012)

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