

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

**ECUADOR**

**PROGRAM TO STRENGTHEN THE NATIONAL EARLY WARNING SYSTEM**

**(EC-L1221)**

**LOAN PROPOSAL**

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<b>ELECTRONIC LINKS</b>
<b>REQUIRED</b>
1. <a href="#">Project Execution Plan (PEP)</a>
2. <a href="#">Annual Work Plan (AWP)</a>
3. <a href="#">Monitoring and Evaluation Plan</a>
4. <a href="#">Procurement Plan</a>
<b>OPTIONAL</b>
1. <a href="#">Program Economic and Financial Analysis</a>
2. <a href="#">Institutional Assessment</a>
3. <a href="#">Ecuador: Risk Management and Disaster Risk Indicators</a>
4. <a href="#">Safeguard Policy Filter (SPF) and Safeguard Screening Form (SSF)</a>

## ABBREVIATIONS

AWP	Annual work plan
CGE	Contraloría General del Estado [Office of the Comptroller General]
EM-DAT	The International Disaster Database
EWS	Early warning system
ICB	International competitive bidding
IG-EPN	Instituto Geofísico de la Escuela Politécnica Nacional [Geophysics Institute at the National Polytechnic School]
IGPH	Instituto Panamericano de Geografía e Historia [Pan-American Institute of Geography and History]
INAMHI	Instituto Nacional de Meteorología e Hidrología [National Institute for Meteorology and Hydrology]
INOCAR	Instituto Oceanográfico de la Armada [Army Oceanographic Institute]
IRR	Internal rate of return
NCB	National competitive bidding
NPV	Net present value
QCBS	Quality- and cost-based selection
RMI	Risk management index
SENPLADES	Secretaría Nacional de Planificación y Desarrollo [National Planning and Development Department]
SEPA	Sistema de ejecución de planes de adquisición [Procurement plan execution system]
SGR	Secretaría de Gestión de Riesgos [Office of Disaster Risk Management]
SIGEF	Sistema de Información de la Gestión Financiera [Financial Management Information System]
VSL	Value of a statistical life
WAL	Weighted average life

## PROJECT SUMMARY

### ECUADOR PROGRAM TO STRENGTHEN THE NATIONAL EARLY WARNING SYSTEM (EC-L1221)

Financial Terms and Conditions				
<b>Borrower:</b> Republic of Ecuador			<b>Flexible Financing Facility<sup>(a)</sup></b>	
			<b>Amortization period:</b>	25 years
<b>Executing agency:</b> ECU-911 Integrated Security Service (ECU-911)			<b>Original WAL:<sup>(b)</sup></b>	15.25 years
			<b>Disbursement period:</b>	3 years
<b>Source</b>	<b>Amount (US\$)</b>	<b>%</b>	<b>Grace period:</b>	6 years
<b>IDB (Ordinary Capital):</b>	12,447,779	81	<b>Inspection and supervision fee:</b>	(c)
			<b>Interest rate:</b>	LIBOR-based
<b>Local:</b>	2,852,221	19	<b>Credit fee:</b>	(c)
<b>Total:</b>	15,300,000	100	<b>Currency:</b>	U.S. Dollars from the Bank's Ordinary Capital
Project at a Glance				
<b>Project objective/description:</b> The general objective of the program is to strengthen the national early warning system for tsunamis and riverine floods. The specific objectives are as follows: (i) to strengthen national monitoring, forecasting, and alert capacities for tsunamis and riverine floods; and (ii) to improve community capacity to understand and respond to such alerts.				
<b>Special contractual clauses precedent to the first disbursement of the loan:</b> (i) signature and entry into effect of a subsidiary agreement between the Ministry of Finance and the executing agency, indicating that the loan proceeds will be transferred to the program and recorded thereunder in a timely manner and used according to the terms and purposes agreed upon in the loan contract; (ii) appointment of a technical program management team consisting of the following: (a) four positions (paragraph 3.3); (b) a technical coordinator designated by the Office of Disaster Risk Management (SGR); (c) at least one point of contact on the program management team for each beneficiary entity; and (d) appointment by the SGR of at least one technical specialist to support the program management team; (iii) approval and entry into effect of the program Operating Manual; (iv) signature and entry into force of an interagency cooperation agreement between the executing agency and beneficiary entities that determines the obligations of each during and after program implementation; (v) availability of the financial guarantees for the items included in the procurement plan; (vi) demonstration by the executing agency to the Bank's satisfaction that sufficient resources have been allocated to cover program execution for at least the first calendar year; and (vii) presentation of evidence of the call for bids for the equipment, with the procurement process to begin in the first year of execution under the ex ante review modality (paragraph 3.4).				
<b>Exceptions to Bank policy:</b> N/A				
Strategic Alignment				
<b>Challenges:<sup>(d)</sup></b>	SI <input type="checkbox"/>	PI <input type="checkbox"/>	EI <input type="checkbox"/>	
<b>Crosscutting Issues:<sup>(e)</sup></b>	GD <input type="checkbox"/>	CC <input checked="" type="checkbox"/>	IC <input type="checkbox"/>	

<sup>(a)</sup> Under the terms of the Flexible Financing Facility (document FN-655-1), the borrower has the option of requesting changes to the amortization schedule, as well as currency and interest rate conversions. The Bank will take operational and risk management considerations into account when reviewing such requests.

<sup>(b)</sup> The original weighted average life (WAL) of the loan may be shorter, depending on the effective signature date of the loan contract.

<sup>(c)</sup> The credit fee and inspection and supervision fee will be established periodically by the Board of Executive Directors as part of its review of the Bank's lending charges, in accordance with the relevant policies.

<sup>(d)</sup> SI (Social Inclusion and Equality); PI (Productivity and Innovation); and EI (Economic Integration).

<sup>(e)</sup> GD (Gender Equality and Diversity); CC (Climate Change and Environmental Sustainability); and IC (Institutional Capacity and Rule of Law).

## I. DESCRIPTION AND RESULTS MONITORING

### A. Background, problem to be addressed, and rationale

- 1.1 **Risk context involving multiple threats.** Ecuador is among the countries that are most vulnerable to natural threats (for example, earthquakes, tsunamis, floods, droughts, and volcanic eruptions). According to the World Bank (2005), 47.6% of its territory and 74.6% of its population are exposed to at least two natural threats. According to the international disaster database [DesInventar](#) (2016), there were 27,680 disasters between 1990 and 2015, and 96 were large-magnitude events. Large-magnitude disasters caused more than 14,000 deaths and affected 4.5 million people ([EM-DAT, 2016](#)). Direct losses due to disasters over that period totaled US\$3.76 billion ([EM-DAT, 2016](#)).
- 1.2 Disasters in Ecuador can be divided into two categories, based on frequency and magnitude:
- Large-magnitude, low-frequency disasters (such as earthquakes and tsunamis). Between 1900 and 2005, the country recorded 17 large-magnitude earthquakes (EM-DAT, 2016) and 6 tsunamis ([IGPH, 2005](#)). These disasters caused more than 11,000 deaths and affected 398,000 people (EM-DAT, 2016). The country's vulnerability to these events became clear on 16 April 2016 when an earthquake measuring 7.8 on the moment magnitude scale hit the northern coastal region. The event, along with several aftershocks, affected 35,000 homes and led to the loss of 21,823 jobs ([SENPLADES, 2016](#)). Several locations experienced a minor tsunami after the earthquake.
  - Small-magnitude, high-frequency disasters (riverine or other types of floods).<sup>1</sup> Between 1900 and 2015, there were more than 3,400 floods in the country, causing 640 deaths and affecting 460,000 people (DesInventar, 2016). The region that is most susceptible to riverine flooding is the coast (encompassing the provinces of Guayas, Santa Elena, El Oro, Esmeraldas, and Manabí).<sup>2</sup> So far in 2016, several rivers have flooded in the provinces of Esmeraldas, Manabí, Guayas, and El Oro, affecting 14,495 people ([SGR, 2016](#)).
- 1.3 The experience of multiple threats in a single location in 2016 (in Esmeraldas and Manabí, specifically) points up the need to strengthen integrated risk management in the country, including the systematic processing of threat and forecast information and communications about emergencies between the government and citizens.
- 1.4 **Institutional and policy framework.** Ecuador has made significant progress in its policy framework for disaster risk management in recent years. Disaster risk management policy is mentioned explicitly in the Constitution, which states that the State should protect individuals, communities, and nature against the negative impact of natural or man-made disasters (Article 389). The National Plan for Well-Being 2013-2017 emphasizes the importance of a crosscutting approach to risk management for national development. The Office of Disaster Risk Management (SGR), a ministry-level institution, was created in 2012 and is the government's lead

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<sup>1</sup> Riverine floods are one of many types of floods. Other types of flooding in Ecuador are the result of rainfall (and inadequate drainage systems) and tidal floods in coastal areas. The risk of riverine flooding is increasing due to climate change.

<sup>2</sup> See paragraph 1.10 (b).

- agency for disaster risk management. The ECU-911 Integrated Security Service was created in 2013 to support the coordination of emergency response activities throughout Ecuador.
- 1.5 Notwithstanding this progress, there is a need to improve the capacity of institutions, communities, and citizens for reducing risk. This need is confirmed by the Bank's work in evaluating the risk management index (RMI), which encompasses a set of indicators related to the country's disaster risk management capacity.<sup>3</sup> The last estimate, from 2013, yielded a score of 37.34 (on a scale of 0 to 100), suggesting that there is a pressing need to improve the national early warning system. The latter includes: (i) coordination for emergency preparedness between local and central government agencies; and (ii) local emergency response planning.
  - 1.6 National government entities,<sup>4</sup> in coordination with the Committee for Reconstruction and the Reactivation of Production and Employment, are currently working to rebuild and rehabilitate public infrastructure and housing, with a view to reestablishing public services and reactivating economic activity in the areas affected by the April 2016 earthquake. These actions are incorporating the "build back better" concept to ensure that the country will be better prepared for future events. A central feature of this approach is the strengthening of the national early warning system (EWS).<sup>5</sup> This dovetails with the objective of considerably increasing the availability of EWSs, one of the seven global objectives under the Framework for Action 2015-2030.<sup>6</sup>
  - 1.7 **Definition and general benefits of early warning systems.** EWSs generally consist of three elements that must work in coordination: (i) monitoring and analysis of threats (using information compiled from observatories of natural phenomena); (ii) issuance of alerts to the local authorities and population; and (iii) actions to prepare citizens (evacuation to safe locations) after an alert is received. There are several types of EWSs that vary according to their territorial coverage (community, provincial, or national) and the type of threat (tsunamis, dam overflows, or hurricanes). The proposed program will focus on strengthening the national EWS, with emphasis on two specific threats: tsunamis and riverine flooding.
  - 1.8 The advantages of an effective and well-maintained EWS are twofold: (i) it is a very effective way to reduce the number of deaths and injuries and expedite the return of communities to their productive activities following a disaster ([Taubenbock, 2009](#)); and (ii) it provides for timely evacuation, particularly of vulnerable groups (children, elderly adults, members of indigenous groups, and people with disabilities), who generally have less access to information in an emergency situation ([United Nations International Strategy for Disaster Reduction, 2006](#)). An EWS may have additional effects, such as creating solidarity through community sirens ([Hori and Shaw, 2012](#)). In Europe, EWSs for hydrometeorological events are estimated to prevent hundreds of deaths each year and between 460 million and 2.7 billion euros in economic

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<sup>3</sup> See <http://www.iadb.org/en/topics/natural-disasters/disaster-risk-indicators,2696.html>.

<sup>4</sup> For example, the Ministry of Urban Development and Housing, and the Ministry of Transportation and Public Works.

<sup>5</sup> See the ECU-911 proposal: <http://www.ecu911.gob.ec/biblioteca/>.

<sup>6</sup> The Third United Nations World Conference on Disaster Risk Reduction was held in March 2015. Representatives from 187 countries attended, including Ecuador, and the Framework for Action 2015-2030 was adopted. The framework mandates a combination of actions: early warning systems, protection works, and preparedness activities by communities.

damages from disasters, as well as generating between 3.4 billion and 34 billion euros in additional benefits through the optimization of production in climate-sensitive sectors (e.g. agriculture) ([Hallegatte, 2012](#)). In Bangladesh, [Bimal \(2009\)](#) explains that Cyclone Sidr in 2007 caused 3,400 fewer deaths than other, similar storms (Gorki killed more than 140,000 people in 1991); this was due to effective forecasting of the storm, which allowed a flood warning to be issued promptly. In the case of tsunamis, [Escaleras and Register \(2008\)](#) used an econometric approach to analyze 146 tsunamis from 1966 to 2004 and found that EWSs reduced fatalities by 15.3%. Another study shows that investment in EWSs is economically viable, with benefits exceeding costs by a factor of between 4 and 36 ([Wethli, 2014](#)).

- 1.9 **Early warning systems in Ecuador.** Ecuador has been developing a national EWS for a number of specific threats, including, for example, eruptions of the Cotopaxi and Tungurahua volcanoes.<sup>7</sup> However, the system does not provide complete coverage for significant threats such as tsunamis and riverine flooding. Although stations have been set up to monitor, for example, flooding in the Zarumilla-Cañar watershed, they are not equipped to issue alerts to the communities.<sup>8</sup> The EWS for volcanoes and other EWSs to be developed in Ecuador should operate based on a single technological platform that brings together all operators once an alert has been issued and enables the message to be widely disseminated to citizens living in the areas exposed to the threats.
- 1.10 The rationale for building out the existing EWS to also cover tsunamis and riverine flooding is as follows:
  - a. **Tsunamis.** Ecuador's coastal provinces (Guayas, Santa Elena, El Oro, Esmeraldas, and Manabí) and Galápagos are at high risk of multiple threats, specifically earthquakes and tsunamis. In Ecuador, 6.4% of the population is exposed to tsunamis produced by seismic activity.<sup>9</sup> Ecuador's beaches, especially in the provinces of Esmeraldas, Manabí, and Galápagos, have hotel and tourism infrastructure that has gained in importance nationally and internationally, while urban districts have expanded to include areas very close to the sea, increasing their vulnerability. Tourism in Esmeraldas and Manabí generates revenues of more than US\$123 million, equivalent to 6% of value-added in national tourism. Moreover, the northern part of Esmeraldas is one of the most productive sectors of the Ecuadorian coast, due to its lush vegetation, archaeological sites, and wood, fishing, and shrimp industries, the shellfish trade, and a budding ecotourism industry. Esmeraldas' primary sector is vital to the Ecuadorian economy, contributing nearly 8% of gross value-added in the country's agricultural, livestock, forestry, and fishing activities. Much of this economic activity is exposed to the risk of tsunamis.
  - b. **Riverine flooding.** At least 18% of the Ecuadorian population is exposed to flooding (including riverine flooding). During the last winter period

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<sup>7</sup> With IDB financing (1707/OC-EC). See paragraph 1.16.

<sup>8</sup> The recent earthquake and tsunami on the Ecuadorian coast demonstrated that many citizens do not receive timely threat forecasts.

<sup>9</sup> Source: ECU-911.



(January-May 2016), there were 410 cases of riverine flooding, almost 80% of which were in the coastal region.<sup>10</sup> According to the SGR, the program will prioritize the Chone and Portoviejo watersheds in the province of Manabí and the Chongón watershed in Guayas, which are among the most vulnerable to riverine flooding.

- (i) The Chone watershed (province of Manabí) has been affected by several riverine flooding events in recent years (2010, 2012, 2013, 2015, and 2016). It is estimated that 16% of the surface area of the Chone watershed (373.5 square kilometers) is susceptible to riverine flooding. At least 225,567 inhabitants are exposed to this threat (70% of the total population). The agricultural economy is chronically exposed to flooding: 95.1% of the Chone basin consists of vulnerable agricultural production areas ([INFOPLAN-IGM, 2009](#), cited in Clavijo and Peñaherrera, 2013).
- (ii) The Portoviejo watershed (province of Manabí) has been affected by several riverine flooding events in recent years (2009, 2012, 2013, and 2016). It is estimated that 17.3% of the Portoviejo basin (359.6 square kilometers) is susceptible to flooding. At least 81,193 inhabitants are exposed to this threat (35% of the total population). The agricultural economy is chronically exposed to flooding: 86.2% of the Portoviejo basin area consists of vulnerable agricultural production areas (INFOPLAN-IGM, 2009, cited in Clavijo and Peñaherrera, 2013).
- (iii) The Daule River watershed (Chongón, province of Guayas) experienced flooding in its lower reaches in 2012, 2015, and 2016. Although there are no major human settlements in the upper part of the watershed (INFOPLAN-IGM, 2009, cited in Clavijo and Peñaherrera, 2013), its proximity to the city of Guayaquil means that all the areas located along the beltway to the northeast of the city (which are home to 22% of the population, or 499,883 inhabitants) are vulnerable to flooding (INFOPLAN-IGM, 2009, cited in Clavijo and Peñaherrera, 2013).

**1.11 Recent improvements to the EWS for tsunamis and riverine flooding.** In recent years, the institutions that operate the EWS have strengthened capacity to improve the national EWS for tsunamis and riverine flooding. For example, in 2013, the Government of Ecuador and the Japan International Cooperation Agency signed a technical cooperation agreement for the project “Improving Earthquake and Tsunami Monitoring Capacities for Tsunami Early Warnings.”<sup>11</sup> The project financed the installation of: (i) 7 seismographs and accelerographs as part of the seismic monitoring network administered by the Geophysics Institute at the National Polytechnic School (IG-EPN); and (ii) 4 servers for processing and analyzing tsunami information at the Army Oceanographic Institute (INOCAR). It also

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<sup>10</sup> SGR, 2016. “Closing report. Winter period, 2015-2016,” Information Management and Risk Analysis Division.

<sup>11</sup> <http://www.gestionderiesgos.gob.ec/proyecto-de-mejoramiento-de-la-capacidad-de-monitoreo-de-terremotos-y-tsunamis-para-la-alerta-temprana-de-tsunami-en-ecuador/>.

- facilitated: (i) the protocol for early warning communications by the SGR; and (ii) emergency plans for 9 coastal municipios.<sup>12</sup>
- 1.12 At the same time, and with a view to strengthening the national EWS for tsunamis and riverine flooding, the government has drawn on own resources in 2016 to install: (i) 93 community sirens in 74 communities (60 for tsunamis and 14 for riverine flooding) in the provinces of Esmeraldas and Manabí; (ii) 12 additional IG-EPN stations for seismographs, accelerographs, and geographical positioning systems in Esmeraldas and Manabí; and (iii) 2 additional hydrological stations for the National Institute for Meteorology and Hydrology (INAMHI) in the province of Esmeraldas; (iv) signage and lighting in 55 communities in Esmeraldas and Manabí, showing the evacuation route and safe locations in the event of tsunamis.
- 1.13 In light of the aforementioned projects, the status of the national EWS<sup>13</sup> for tsunamis and riverine flooding in each institution is as follows:
- a. **IG-EPN.** The Geophysics Institute at the National Polytechnic School (IG-EPN) is the main research center in Ecuador for the assessment and monitoring of geophysical threats, including earthquakes. It has a national seismic monitoring system<sup>14</sup> that is in continuous operation, 24 hours per day and 7 days per week. When an earthquake occurs, the Geophysics Institute is able to identify the location, depth, and magnitude of the event and analyze ground movement patterns. This information can be transmitted to INOCAR to assess the likelihood of tsunamis immediately following the earthquake. This national system requires additional stations to support a faster, more effective earthquake identification process (paragraph 1.14 a). In addition, a number of seismic monitoring stations are in need of repair due to the impact of the April 2016 earthquake. Many stations lack communication redundancy.<sup>15</sup>
  - b. **INOCAR.** The Army Oceanographic Institute (INOCAR) is responsible for monitoring and analyzing tsunami threats along Ecuador's coastlines. It uses meteorological and oceanographic networks for the purposes of marine observation. The network was last updated in 2014; however, the majority of its stations are not yet automated. INOCAR strengthened tsunami observation with two first-generation DART buoys,<sup>16</sup> but one of these buoys is out of service as a result of the April 2016 earthquake and tsunami. Based on the seismic information shared by the IG-EPN, INOCAR will be able to analyze the

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<sup>12</sup> The municipios of Esmeraldas, Muisne, Atacamas, San Vicente, Pedernales, Salinas, Playas, Santa Cruz, and Portoviejo.

<sup>13</sup> Consistent with the national EWS coordination protocols issued by the SGR, the involvement of a number of public agencies is required for coordination and timely exchange of information. The applicability of the EWS protocol will be reviewed during the national simulation exercise (paragraph 1.22 (iv)), which will determine whether there are any gaps that require additional support.

<sup>14</sup> The system currently has 184 stations with seismographs and accelerographs (for measuring movement and identifying earthquake epicenters and magnitudes) and 64 global positioning system receivers (for observing ground movement following earthquakes), set up throughout the country.

<sup>15</sup> Redundancy refers to the ability to communicate even following disaster-related failures, via radio and satellite for example.

<sup>16</sup> Deep-ocean assessment and reporting of tsunami (DART) buoys record water pressure and detect tsunamis. The two INOCAR buoys are first generation, while those currently on the market are fourth generation.

likelihood of a tsunami and its characteristics (wave height, time of arrival, and possible areas of impact). However, INOCAR needs a better and faster way to identify tsunamis (paragraph 1.14 (a)).

- c. **INAMHI.** The National Institute for Meteorology and Hydrology (INAMHI) is responsible for hydrometeorological monitoring based on a network of stations in the country. Since 1964, INAMHI has had a national monitoring network that currently covers 48.6% of hydrological stations; however, the majority of its stations are not yet automated. Moreover, between 5% and 7% of stations need substantial maintenance. INAMHI lacks flood risk maps indicating the probability of these events.
  - d. **SGR.** As the coordinating body for the national decentralized disaster risk management system, the Office of Disaster Risk Management (SGR) is responsible for decisions to activate the EWS.<sup>17</sup> The Office recently developed an emergency tsunami communications protocol for the IG-EPN, INOCAR, the SGR, and ECU-911. It has also prepared tsunami evacuation maps for 55 communities in the provinces of Esmeraldas and Manabí. These maps include safe zones and clear indication of evacuation routes; signage and lighting has also been installed along escape routes in these communities. Nonetheless, evacuation maps and training workshops still need to be developed for other vulnerable communities (paragraph 1.14 (d)).
  - e. **ECU-911.** Based on the information generated and shared through the SGR, the Integrated Security Service (ECU-911) transmits alerts to the population by means of community sirens and other means of communication. In 2016, 93 sirens were deployed in 60 communities<sup>18</sup> in the tsunami zone of the provinces of Esmeraldas and Manabí, and in 14 communities in the area exposed to riverine flooding in the same two provinces. Each siren is accompanied by a security and monitoring camera, with the aim of permanently contributing to citizen security in collaboration with the police and fire departments.<sup>19</sup> Sirens with cameras need to be deployed in other vulnerable communities (paragraph 1.14 (c)).
- 1.14 **Challenges.** Despite this progress, some challenges remain in terms of improving the national EWS for tsunamis and riverine flooding, notably the following:
- a. **Information processing times for tsunami alerts.** The current amount of time required to process a tsunami alert is around 20 minutes.<sup>20</sup> However, an earthquake near the coast can produce a tsunami that reaches the coast within 15 minutes or less. If alert processing times are to be shortened, a faster, more

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<sup>17</sup> The type of alert varies depending on the threat. In the case of tsunamis, the alerts are as follows: Red (imminent threat), Warning (high probability of an event), Observation, Information, and Cancellation.

<sup>18</sup> Within these 60 communities, 55 have installed signage and lighting to indicate the evacuation route, an activity carried out by the SGR (paragraph 1.13 (d)).

<sup>19</sup> The 3,000 ECU-911 security cameras throughout the country are part of the permanent national security system. This monitors incidents/accidents in real time and coordinates with the police, fire departments, or other public entities. The 93 sirens deployed in Esmeraldas and Manabí are part of this permanent security monitoring.

<sup>20</sup> From occurrence of an earthquake monitored by the IG-EPN, analysis by INOCAR of the likelihood of a tsunami, a decision on the alert level by the SGR, to the issuance of a mass notification by ECU-911.

effective identification process needs to be implemented, for example by improving data collection and processing capacity in the IG-EPN and INOCAR center by expanding and upgrading the coverage of the national seismic and tsunami monitoring network, respectively. A system of communication redundancy (with a backup system) is also required so that the monitoring of seismic and tsunami events is not interrupted, even by high-intensity events. Another important issue is to reduce communication times between each EWS operating agency, by means of simulations with collective participation.

- b. **Low coverage of automated hydrological stations.** There are few automated stations in the three priority watersheds (Chone, Portoviejo, and Chongón), and some are out of service. The hydrological monitoring network in these watersheds needs to be modernized. Riverine flooding occurs in the basins from January to May each year, and there is a need for real-time hydrological information. There is also a need to establish a protocol so that the private company operating the drinking water system shares hydrological information with INAMHI.
  - c. **Low coverage of communities receiving direct alert information.** The community sirens administered by ECU-911 are only in 74 communities in the provinces of Esmeraldas and Manabí (paragraph 1.13 (e)). The same infrastructure needs to be installed in other critical communities in areas vulnerable to tsunamis and riverine flooding in the provinces of Santa Elena, Guayas, El Oro, and Galápagos.
  - d. **Lack of community training and awareness-building.** Community training, awareness-building, and communications campaigns are critical activities for an efficient EWS.<sup>21</sup> Community preparedness capacities need to be strengthened to understand the different alert levels (particularly red alert and warning) and to respond effectively to each level. In this regard, communities in the provinces of Esmeraldas, Manabí, Santa Elena, Guayas, El Oro, and Galápagos need to be trained to respond to tsunami and riverine flooding emergencies.
  - e. **Failure to define alternative evacuation routes.**<sup>22</sup> A number of settlements in low-lying, flat areas, close to low-gradient beaches, are at very high risk due to their lack of an evacuation point.<sup>23</sup> In these cases, an alternative solution for providing an evacuation point needs to be found, including the construction of a location allowing the vertical evacuation of all residents and tourists in an area.
- 1.15 **Bank support for disaster risk management in Ecuador.** In recent years, the Bank has approved seven projects (three loans and four technical cooperation

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<sup>21</sup> See, for example, <http://www.bbc.com/news/world-latin-america-35206080>.

<sup>22</sup> Although this significant problem has been identified, the program cannot address it due to budgetary limits.

<sup>23</sup> For example, in the municipio of Cojimíes (a tourist area in the province of Manabí), the assigned tsunami evacuation zone takes 30-40 minutes by vehicle.

operations) in the area of disaster risk management in Ecuador.<sup>24</sup> Of these, four projects—one loan (1707/OC-EC) and three technical cooperation operations (ATN/MD-11327-EC, ATN/OC-11386-EC, and ATN/JF-15752-EC)—focused on prevention and strengthening of local capacity, including support for an “Early Warning System and Natural Risk Management” for Cotopaxi and Tungurahua Volcanoes under loan 1707/OC-EC. The three remaining operations (EC-X1014, 3751/OC-EC, and ATN/OC-15539-EC) were aimed at financing response and rehabilitation activities following the April 2016 earthquake. Under a contingent credit facility (EC-X1014), US\$160 million was disbursed to provide immediate support to the government for responding to the emergency in the energy, health, and water and sanitation sectors, and for removing debris, etc. In September 2016, financing of US\$19.7 million was approved under the immediate response facility (3751/OC-EC) for the ongoing rehabilitation of roads and water and sanitation infrastructure. The proposed program complements the aforementioned operations and aims to strengthen the EWS to improve disaster prevention.

- 1.16 **Lessons learned.** Based on the experience gained under the aforementioned operations, Box I-1 shows the main lessons learned and how these have been incorporated into the proposed program.

**Box I-1. Incorporation of Lessons Learned**

Lessons learned	Reflection in program
The EWS should be a participatory and socially inclusive tool. Although the information is effectively shared, citizens sometimes ignore it.	Organize participatory training workshops, awareness-building campaigns, and community drills (paragraph 1.23).
Coordinate between various public entities as an operational part of the EWS, in order to establish coordination mechanisms and assist communities with evacuation.	Review and update the protocol for communication between agencies operating the EWS (paragraph 1.22).
Sustainable use and maintenance of EWS facilities.	Assign a coordination unit to maintain siren infrastructure while simultaneously using the EWS as a citizen security facility, in coordination with the police and fire departments (paragraphs 1.13 (e) and 1.23).

- 1.17 **Program rationale.** Weak EWS coverage for riverine flooding in Ecuador, the considerable amount of time required to process tsunami alerts, and the lack of community training and awareness are factors that contribute to the high number of victims from tsunamis and riverine flooding in the country. Tackling these challenges (paragraph 1.14) would help to increase resilience in the event of a disaster. The objective of the measures to be implemented is to allow the population and the authorities to prepare themselves in a timely manner to effectively contend with

<sup>24</sup> Loans: (i) “Early Warning System and Natural Hazard Management” (1707/OC-EC) with US\$5 million in financing, completed in 2011; (ii) the Contingent Loan for Natural Disaster Emergencies (EC-X1014, 2014, in the amount of US\$300 million); and (iii) Emergency Program for an Immediate Response to the Earthquake in Ecuador (EC-L1218, 2016, US\$19.72 million). Technical cooperation projects: (i) “Strengthening of Risk Management Capacity in Esmeraldas” (EC-T1081, 2008-2011); (ii) “Support for the Disaster Risk Management System in the Province of Pichincha” (EC-T1124, 2008-2011); (iii) “Emergency Support following the Earthquake in Ecuador” (EC-T1349, 2016); and (iv) “Support to Ensure the Resilience of Public Infrastructure” (EC-T1354, 2016).

recurrent natural threats. Specifically, the proposed program will help to (i) strengthen the national monitoring platform and the early warning communication system by improving monitoring and data transmission equipment; and (ii) expand coverage of the population through siren equipment, communication networks, and community awareness protocols.

- 1.18 **IDB country strategy with Ecuador 2012-2017 (document GN-2680).** The country strategy includes disaster risk management as a priority sector, with the objective of reducing social and environmental vulnerability to risks posed by natural and man-made processes. Accordingly, the proposed program is aligned with the country strategy.
- 1.19 **Strategic alignment.** The program is consistent with the Update to the Institutional Strategy 2010-2020 (document AB-3008). Specifically, its activities under Component 1 (i) (paragraph 1.23 (i)) are aligned with the crosscutting area of climate change and environmental sustainability, as strengthening of the EWS to address riverine flooding will help to increase the country's knowledge of climate change and how to prepare for this phenomenon.<sup>25</sup> The program is also consistent with the Integrated Strategy for Climate Change Adaptation and Mitigation, and Sustainable and Renewable Energy (document GN-2609-3),<sup>26</sup> as well as the Climate Change Sector Framework document (GN-2835-1).<sup>27</sup> Approximately 68% of funds under the program will be invested in climate change adaptation activities, consistent with the [joint methodology](#) used by the multilateral development banks. These funds contribute to the IDB Group's target of increasing financing for climate-change related projects to 30% of all approved operations by the end of 2020.
- 1.20 **Program beneficiaries.** The identified priority area of intervention encompasses 119 communities in 6 provinces (El Oro, Esmeraldas, Galápagos, Guayas, Manabí, and Santa Elena). The resident population in these locations that is exposed to tsunamis and will directly benefit from the intervention totals approximately 1,034,929 people, equivalent to 6% of the national population (Ecuadorian National Statistics Institute, 2010). The proportion of inhabitants that will benefit varies across the provinces: 0.4% in El Oro, 2% in Guayas, 26% in Manabí, 48% in Esmeraldas, 67% in Santa Elena, and 100% in Galápagos. The proportion of the population that is exposed to riverine flooding and will directly benefit from the intervention totals approximately 721,456 people,<sup>28</sup> with 69% located in the province of Guayas and 31% in the province of Manabí.

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<sup>25</sup> See the results matrix, specifically the second outcome indicator under Component 1, and the indicator for output 1.1.

<sup>26</sup> It is consistent with Line of Action A: Strengthen the knowledge base priorities.

<sup>27</sup> It is consistent with the topic of "disaster risk management" in Box 5 of the document.

<sup>28</sup> People living in the Chone and Portoviejo watersheds in Manabí are considered to be beneficiaries. Although there are no major human settlements in the upper part of the Chongón watershed, the proximity of the lower watershed to the city of Guayaquil means that the 499,883 residents of the northeastern part of the city (22% of the population) who are vulnerable to floods will benefit directly from the installation of automated hydrological stations, which will effectively reduce the likelihood of flooding in the lower part of the watershed.

## **B. Objectives, components, and cost**

- 1.21 **Objective.** The general objective of the program is to strengthen the national early warning system (EWS) for tsunamis and riverine floods.<sup>29</sup> The specific objectives are as follows: (i) to strengthen national monitoring, forecasting, and alert capacities for tsunamis and riverine floods; and (ii) to improve community capacity to understand and respond to such alerts. In the case of riverine flooding, activities will focus on the three priority watersheds—Chone, Portoviejo, and Chongón—which were selected due to their high exposure to these threats in accordance with the government’s prioritization parameters.
- 1.22 **Component 1. Strengthening of the national monitoring and forecasting network (US\$5.35 million).** This component seeks to strengthen the capacity of the national seismic, tsunami, and water monitoring network to make timely decisions on early warnings for tsunamis and riverine flooding. It will include: (i) the purchase and installation of hydrometeorological stations to expand the coverage of automated climate risk monitoring in three rivers: Chone (province of Manabí), Portoviejo (province of Manabí), and Chongón (province of Guayas). Based on these hydrometeorological data, probabilistic studies and maps of flood threats will be developed for each river; (ii) the purchase and installation of seismic monitoring stations in high risk areas (specifically, the coastal region); (iii) strengthening of the national marine and tsunami observation network run by INOCAR, including the purchase and installation of buoys and radar; and (iv) the organization of national collective simulations to improve interagency coordination mechanisms under the EWS for running annual tests and adjusting the EWS activation protocols for tsunamis and riverine flooding.
- 1.23 **Component 2. Strengthening of the alert system and community response capacity (US\$9.71 million).** This component seeks to increase the number of citizens who receive alerts via the sirens to be installed in the communities and who know how to proceed in the case of emergency (e.g. evacuation to safe areas). It will include: (i) the purchase and installation, under the supervision of the ECU-911, of community sirens with security cameras and monitoring<sup>30</sup> for (a) tsunami risk in 40 communities in the provinces of Santa Elena, Guayas, El Oro, and Galápagos, and (b) flooding risk along rivers (Chone, Portoviejo, and Chongón) in five communities in the provinces of Guayas and Manabí; (ii) the purchase, installation, and delivery, under the supervision of the ECU-911, of radio communication equipment in fire departments<sup>31</sup> in the provinces of Guayas, Santa Elena, El Oro, and Galápagos, so that the departments can assist communities in evacuating; (iii) the identification and installation of signage indicating evacuation routes and rendezvous points, in coordination with local authorities and under the supervision of the SGR, for (a) 40 communities in the tsunami risk zone where sirens will be installed in the provinces of Santa Elena, Guayas, El Oro, and Galápagos; and (b) 19 communities in the riverine flood risk zones in the provinces of Guayas and Manabí (including the 14 communities where sirens have already been installed),

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<sup>29</sup> The EWS for riverine flooding is aligned with the climate change adaptation objective. See paragraph 1.19.

<sup>30</sup> Sirens with security cameras are part of the national security system, to ensure sustainability of the daily use of these facilities (paragraph 1.13e).

<sup>31</sup> By law, the fire departments are part of the ECU-911. In the event of a disaster, fire departments should respond first.

and (iv) community workshops and drills, under the supervision of the SGR and in coordination with local authorities, in 119 localities<sup>32</sup> in the provinces of Esmeraldas, Manabí, Santa Elena, Guayas, El Oro, and Galápagos, to improve their response capacity for evacuation in the event of a disaster. Inclusion of a gender focus is planned in both the community training and the communication campaigns.<sup>33</sup> Communication protocols will also be prepared for the tsunami and riverine flooding EWS, and drills will be carried out at the provincial level in Esmeraldas, Manabí, Santa Elena, Guayas, El Oro, and Galápagos.

- 1.24 **Program management, administration, audits, and evaluation (US\$0.24 million).** Financing will be provided for: (i) program administrative management; (ii) personnel and equipment for the program management team; (iii) external financial audits; and (iv) monitoring and evaluation activities.

**Table I-1. Program costs (US\$)**

Component	IDB	Shopping	Total
<b>Component 1.</b> Strengthening of the national monitoring and forecasting network	\$4,680,000	\$673,700	\$5,353,700
<b>Component 2.</b> Strengthening of the alert system and community response capacity	\$7,683,179	\$2,023,777	\$9,706,956
Program management, administration, audits, and evaluation	\$84,600	\$154,744	\$239,344
<b>Total</b>	<b>\$12,447,779</b>	<b>\$2,852,221</b>	<b>\$15,300,000</b>

### C. Key results indicators

- 1.25 **Results matrix.** The results matrix (Annex II) contains outcome and output indicators for the program, with their respective intermediate and final targets. The expected long-term impact is a reduction in the number of deaths and injuries from tsunamis and riverine flooding. The risk management index (RMI) is a key indicator that measures institutional and community capacity for preparedness in the event of a disaster. The impact attributable to the proposed program may be gauged by means of comparative before and after measurements of the RMI, since the 2013 result for this indicator is available as a baseline.
- 1.26 **Economic feasibility.** A benefit-cost methodology was used to determine the return on the planned investments. The analysis estimated the main benefits using information in the specialized literature identified during the literature review, as well as the costs of investment, operation, and maintenance for the satisfactory functioning of the national EWS over its estimated useful life. For more detail, see the ex ante economic evaluation report.
- 1.27 The program yields an average internal rate of return (IRR) of 27.1% over a 20-year time horizon, with a net present value (NPV) of US\$20.7 million (discount rate of 12%) and a benefit-cost ratio of 1.99.

<sup>32</sup> This consists of 45 communities under the proposed program and 74 communities from the previous government program (paragraph 1.12).

<sup>33</sup> Greater detail is provided in the Operating Manual.



- 1.28 The analysis included alternative scenarios based on the following modifications: (i) a 7% discount rate applied to future flows; and (ii) a 1-in-250-year probability of a tsunami. The benefit-cost ratio for the intervention varies from 1.2 to 2.47 and is quite sensitive to changes in the indicators and main assumptions (Table I-2).

**Table 1-2. Scenarios involving changes in the discount rate and probability of occurrence**

Supplementary evaluation scenarios	IRR	NPV (US\$ millions)	Benefit-cost ratio
Base-case scenario (VSL US\$283,000 -d=12% -p: 0.002)	27%	20.7	1.99
Reduction in discount rate (VSL US\$283,000 -d=7% -p: 0.002)	27%	39.3	2.47
Occurrence probability (VSL US\$283,000 -d=12% -p: 0.004)	16%	4.2	1.20
Occurrence probability + discount rate (VSL US\$283,000 -d=7% - p: 0.004)	16%	13.1	1.49

- 1.29 Sensitivity analyses were also carried out based on the assumption of a weak community response to alerts. In these cases, the benefit-cost ratio falls to 1.39. Alternatively, a 30% increase in investment and recurrent costs reduces the benefit-cost ratio to 1.54. The analysis concluded that the program is reasonably robust to unfavorable conditions.

## II. FINANCING STRUCTURE AND MAIN RISKS

### A. Financing instruments

- 2.1 The total cost is estimated at US\$15,300,000, of which the Bank will contribute US\$12,447,779 (84%) in the form of a specific investment loan and the local counterpart will contribute US\$2,852,221 (16%). Program procurement processes are described in the procurement plan. Funds will be disbursed over three years.<sup>34</sup>

**Table 1. Disbursement schedule**

	IDB	Local	Total
2017	8,476,974.06	1,584,831.32	10,061,805.38
2018	2,422,218.06	818,197.57	3,240,415.63
2019	1,548,586.88	449,192.11	1,997,778.99
<b>Total</b>	<b>12,447,779.00</b>	<b>2,852,221.00</b>	<b>15,300,000.00</b>

<sup>34</sup> Based on the government's experience (paragraph 1.12), most of the procurements needed for installation of EWS equipment are expected to be executed in the first year, with the exception of the procurement and installation of the buoys (paragraph 1.13 (b)), which is expected to be completed within the first 18 to 24 months of the program. Training, communications, and drill activities, among others, are expected to be completed within the maximum period of three years.

## **B. Environmental and social risks**

- 2.2 In accordance with the Environment and Safeguards Compliance Policy (OP-703), the program has been classified as a category “C” operation.<sup>35</sup> Most financial resources under the program will be for the procurement and installation of equipment for monitoring seismic, tsunami, and riverine flooding events and siren and signal facilities for mass dissemination of information to communities. No environmental or social impacts are envisaged. The program is also determined to be at low risk of disasters in accordance with the Policy for Disaster Risk Management (policy OP-704).

## **C. Fiduciary risks**

- 2.3 The main fiduciary risks, which are of medium level, are as follows: (a) delays or an inability to carry out procurements due to possible delays in obtaining the necessary national precontractual requirements,<sup>36</sup> lack of familiarity with IDB procurement policies, limited capacity in the ECU-911 procurement team, etc.; and (b) delays by the Ministry of Finance in transferring local counterpart resources to the executing agency (paragraph 3.1) due to possible delays in complying with requirements, or external issues related to liquidity management by the country. The planned mitigation actions are: (i) appointment of a program management team (paragraph 3.3) as a precedent condition (paragraph 3.4); (ii) training of the program management team in IDB procurement policies; (iii) presentation of the necessary national precontractual requirements (guarantees) for the first year of execution (paragraph 3.4); (iv) allocation of local counterpart funding for the first year, and as a contractual condition at the beginning of each year of execution for subsequent years (paragraph 3.4); (v) strategic technical arrangements with the institutions involved—SENPLADES and the Ministry of Finance—to facilitate processing of the national financial and precontractual requirements; and (vii) launch of preparations for the main procurement processes prior to the first disbursement (paragraph 3.4).

## **D. Other project risks**

- 2.4 Three medium-level public management and governance risks have been identified, as follows: (a) a lack of clarity regarding the roles of beneficiary entities in managing the program; (b) a reduction in the level of commitment shown by the executing agency and the beneficiary entities; and (c) an inability by the executing agency to cover temporary staffing needs arising from the program workload. The following requirements are proposed to mitigate risks (a) and (b): the approval and entry into effect of the program Operating Manual (paragraph 3.5), the signature and entry into effect of an interagency cooperation agreement, and the appointment of a point of contact in each beneficiary entity as part of the program management team (paragraph 3.4). In the case of risk (c), the program management team will be appointed, including the support of at least one person from the SGR for monitoring

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<sup>35</sup> The program Operating Manual will include eligibility criteria and measures to establish project environmental sustainability. Specifically, it will include: (i) selection criteria for siting equipment (i.e. avoiding the use of private land, and, where appropriate, confirming whether the owner agrees, whether there is any change in the use of his/her land, and what type of compensation will be offered); and (ii) health and safety measures during the installation/maintenance of equipment, in order to protect both workers and the community in general.

<sup>36</sup> Priority designations, budget certifications, guarantees, etc. required by SENPLADES and the Ministry of Finance.

(paragraph 3.4). Additionally, the executing agency's procurement team will be strengthened where necessary during program execution.<sup>37</sup> Furthermore, the interagency cooperation agreement between the executing agency and the beneficiary entities will include details of the budgetary funds allocated by each for the satisfactory operation and maintenance of monitoring stations, communications equipment, sirens, and other materials installed, as well as community drill activities (paragraph 3.4 (iv)).

### III. IMPLEMENTATION AND MANAGEMENT PLAN

#### A. Summary of implementation arrangements

- 3.1 **Borrower and executing agency.** ECU-911 will be the executing agency for the operation. ECU-911 has legal status as a public entity with administrative, operational, and financial autonomy.<sup>38</sup> The executing agency will be responsible for: (i) performing general and financial administration of the program; (ii) planning program execution; (iii) monitoring program progress and compliance; (iv) carrying out procurement and installation processes for equipment and technical services, ensuring conformity with the Bank's procurement policies; (v) processing the corresponding payments; (vi) maintaining a satisfactory accounting and financial system for recording financial transactions using program funds; and (vii) preparing semiannual program progress reports and delivering them to the Bank.
- 3.2 **Beneficiary entities.** The executing agency, which will carry out procurement, will receive technical support for program execution from four beneficiary entities, as follows: INAMHI (for procurements related to the activity described in paragraph 1.22 (i)), IG-EPN (paragraph 1.22 (ii)), INOCAR (paragraph 1.22 (iii)), and SGR (paragraph 1.23 (iii) and (iv)). The beneficiary entities will be responsible for (i) preparing the technical specifications for procurements for their organizations; (ii) participating in the technical committees for selecting, evaluating, and awarding contracts; (iii) receiving and accepting the deliverables and final products of these contracts; and (iv) coordinating with the executing agency the annual planning and semiannual monitoring reports with respect to their products.
- 3.3 **Program management team.** The executing agency will establish a program management team consisting of (i) a general program coordinator; (ii) a planning and monitoring specialist; (iii) a procurement specialist; (iv) a financial specialist; and (v) at least one technical representative assigned by each beneficiary entity to fulfill its responsibilities (paragraph 3.2). The EWS will be strengthened by at least two additional people—a program technical coordinator and a monitoring representative—to be appointed by the SGR in its capacity as the lead agency of the National Decentralized System of Disaster Risk Management.<sup>39</sup> The procurement plan and annual work plan and updates thereto, to be submitted to the Bank for its no objection, will be approved by the program management team and validated by the SGR. The composition and functions of the program management

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<sup>37</sup> Financial resources under technical cooperation project EC-T1354 (ATN/IF-15752-EC) may be used.

<sup>38</sup> Pursuant to Executive Decree 31 of 24 June 2013 amending Executive Decree 988 of 29 December 2011.

<sup>39</sup> Notice AN-MEMC-2012-119, of 10 July 2012.

team will be defined in the Operating Manual and may also be modified therein (paragraph 3.5).

- 3.4 **Special contractual conditions precedent to the first disbursement of the loan.** (i) signature and entry into effect of a subsidiary agreement between the Ministry of Finance and the executing agency, indicating that the loan proceeds will be transferred to the program and recorded thereunder in a timely manner and used according to the terms and purposes agreed upon in the loan contract; (ii) appointment of a technical program management team consisting of the following: (a) four positions (paragraph 3.3); (b) a technical coordinator designated by the SGR; (c) at least one point of contact on the program management team for each beneficiary entity; and (d) appointment by the SGR of at least one technical specialist to support the program management team; (iii) approval and entry into effect of the program Operating Manual; (iv) signature and entry into force of an interagency cooperation agreement between the executing agency and beneficiary entities that determines the obligations of each during and after program implementation; (v) availability of the financial guarantees for the items included in the procurement plan; (vi) demonstration by the executing agency to the Bank's satisfaction that sufficient resources have been allocated to cover program execution for at least the first calendar year; and (vii) presentation of evidence of the call for bids for the equipment, with the procurement process to begin in the first year of execution under the ex ante review modality.
- 3.5 **Operating Manual.** The program Operating Manual will provide details of the program execution strategy and will include: (i) program organizational arrangements; (ii) technical and operational arrangements for program execution; (iii) arrangements for the programming, monitoring, and evaluation of results; (iv) guidelines for financial, audit, and procurement processes; and (v) environmental and social safeguard measures, including the gender focus (paragraph 3.3). The Operating Manual will also determine the functions of the participating administrative entities. The approval and entry into effect of the Operating Manual, under the terms and conditions agreed upon with the Bank, will be a contractual condition precedent to the first disbursement under the program.
- 3.6 **Procurement.** A procurement plan has been agreed upon for the first 18 months of execution. The executing agency will update the procurement plan annually to coincide with annual evaluations and before the end of each calendar year, or whenever substantial changes occur. An execution and monitoring system to be determined by the IDB will be used to update the procurement plan. Goods, works, and consulting services will be procured pursuant to the policies set out in documents GN-2349-9 and GN-2350-9, respectively, as well as document OP-272-2 containing operational guidelines for procurements. Although no direct contracting is anticipated at present, it could arise during execution, to which end the procurement plan will need to be updated in accordance with the guidelines described in this paragraph.
- 3.7 **Disbursements.** Program disbursements will be made in the form of advances of funds in accordance with the project's actual liquidity needs, based on a financial plan reflecting actual funding needs for a maximum period of six months. To this end, ECU-911 will open an exclusive account for the program at the Central Bank of Ecuador, and all program payments will be executed through the e-SIGEF

financial administration system and debited from the Unified Treasury Account. Under this approach, the program may receive a new advance of funds once 80% of the disbursed balance has been executed and justification has been provided to the Bank using the respective annexes. At the borrower's request, the Bank may also make direct payments to suppliers. The supporting documentation for expenditures or payments made by each source will be subject to ex post review following the disbursement of funds by the Bank.

- 3.8 **Audit.** Given that the Office of the Comptroller General lacks sufficient capacity to exercise external control over projects financed by external loans, external audits will be carried out by independent auditors acceptable to the Bank, in accordance with policy document OP-273-6. The firm will be contracted by the executing agency using loan proceeds, via a competitive process, based on terms of reference previously approved by the IDB. The executing agency will present audited program financial statements on an annual basis, within 120 days after the close of each fiscal year, including validation of the internal operational processes and controls implemented by the agency.

**B. Summary of arrangements for monitoring results**

- 3.9 **Monitoring arrangements.** The IDB team will conduct semiannual technical visits to the executing agency to review the progress of activities and make adjustments based on execution. Fiduciary oversight visits will be conducted once a year. External financial audits will be conducted to validate the use of loan resources by the executing agency. The information compiled will be analyzed every six months and the monitoring and progress report will be prepared on an annual basis (see [Monitoring and Evaluation Plan](#)).
- 3.10 **Arrangements for program evaluation.** Program evaluation will include one midterm and one final evaluation, financed by the executing agency from loan proceeds. The executing agency will commission the midterm evaluation once 50% of the loan proceeds have been disbursed and justified, or 15 months from the effective date of the loan contract, whichever occurs first. The final evaluation will be commissioned by the executing agency after 95% of the loan proceeds have been disbursed. These evaluations will be carried out in accordance with the Bank's guidelines for project completion reports. The final evaluation will determine the level of attainment of the targets established in the results matrix. The executing agency will present semiannual and annual reports in accordance with the program monitoring and evaluation plan. At the level of the impact indicator, the risk management index (RMI) (paragraph 1.25) will be measured by running a comparative before and after evaluation, i.e., before the program has begun and after it is completed.<sup>40</sup>

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<sup>40</sup> No evaluation of actual impact is envisaged, as this would only be possible in the event of a natural disaster: a 500-year event.

Development Effectiveness Matrix			
Summary			
<b>I. Strategic Alignment</b>			
<b>1. IDB Strategic Development Objectives</b>		<b>Aligned</b>	
Development Challenges & Cross-cutting Themes	-Climate Change and Environmental Sustainability		
Regional Context Indicators			
Country Development Results Indicators			
<b>2. Country Strategy Development Objectives</b>		<b>Aligned</b>	
Country Strategy Results Matrix	GN-2680	Reduce social and environmental vulnerability to natural and man-made processes that create risk.	
Country Program Results Matrix	N/A	Document under revision.	
Relevance of this project to country development challenges (If not aligned to country strategy or country program)			
<b>II. Development Outcomes - Evaluability</b>			
	Evaluable	Weight	Maximum Score
	8.3		10
<b>3. Evidence-based Assessment &amp; Solution</b>			
	9.6	33.33%	10
3.1 Program Diagnosis	3.0		
3.2 Proposed Interventions or Solutions	3.6		
3.3 Results Matrix Quality	3.0		
<b>4. Ex ante Economic Analysis</b>			
	8.5	33.33%	10
4.1 The program has an ERR/NPV, a Cost-Effectiveness Analysis or a General Economic Analysis	4.0		
4.2 Identified and Quantified Benefits	1.5		
4.3 Identified and Quantified Costs	1.5		
4.4 Reasonable Assumptions	0.0		
4.5 Sensitivity Analysis	1.5		
<b>5. Monitoring and Evaluation</b>			
	6.9	33.33%	10
5.1 Monitoring Mechanisms	2.5		
5.2 Evaluation Plan	4.4		
<b>III. Risks &amp; Mitigation Monitoring Matrix</b>			
Overall risks rate = magnitude of risks*likelihood	Low		
Identified risks have been rated for magnitude and likelihood	Yes		
Mitigation measures have been identified for major risks	Yes		
Mitigation measures have indicators for tracking their implementation	Yes		
Environmental & social risk classification	C		
<b>IV. IDB's Role - Additionality</b>			
The project relies on the use of country systems			
Fiduciary (VPC/FMP Criteria)	Yes	Financial Management: Budget, Treasury, Accounting and Reporting.	
Non-Fiduciary	Yes	Procurement: Information System, Shopping Method, National Public Bidding.	
The IDB's involvement promotes additional improvements of the intended beneficiaries and/or public sector entity in the following dimensions:			
Gender Equality	Yes	Strategic Planning National System, Monitoring and Evaluation National System.	
Labor		The project team and the executing unit will develop a communication strategy with a gender approach to assure that the message is appropriate and reaches women. This will be detailed in the operating manual once the communication strategies have been defined.	
Environment			
Additional (to project preparation) technical assistance was provided to the public sector entity prior to approval to increase the likelihood of success of the project			
The ex-post impact evaluation of the project will produce evidence to close knowledge gaps in the sector that were identified in the project document and/or in the evaluation plan			

Note: (\*) Indicates contribution to the corresponding CRF's Country Development Results Indicator.

The overall objective of the program is to strengthen the national early warning system for tsunamis and river overflows. The specific objectives are: (i) to strengthen national capacity for monitoring, forecasting and emission of tsunami warnings and river overflows; and (ii) improving community capacity to understand and react to such alerts. Two components will be implemented: strengthening of the national monitoring and forecasting network; and strengthening the alert emission system and the capabilities of communities to react.

The documentation is well structured, with a solid diagnosis of the problems faced by the prioritized areas and the Early Warning System in the country. The proposed solution is related to the magnitude of the problems and challenges identified.

The results matrix (MR) reflects the objectives of the program and shows a clear vertical logic for each of the components. The key upper-level indicators have values that are the result of an approximation of how this intervention will affect the country's ability to identify and manage risks. The lower level indicators reflect the design of the two components. The RM includes SMART indicators at the level of impact, results and products with their respective values and targets and means to collect information. Empirical evidence on the effectiveness of such programs in other countries is cited; however, not enough information is provided to validate the external validity of the cited references.

The economic analysis is based on a cost-benefit exercise. The main benefits are a function of the reduction in human losses (lives and injuries) and the reduction of goods. The greatest share of expected benefits comes from savings related to the tsunami threat (80%). The results show an average IRR of 27.1% and a NPV of US\$20.7 million. A sensitivity analysis is performed under alternative scenarios, modifying the main variables that can affect costs and benefits. The conservative scenario finds a 16% IRR, with a NPV of US\$ 4.2 million.

The monitoring and evaluation plan proposes a Before-After evaluation, which is appropriate given the nature of this intervention. The plan is to measure the impact of the program on two sub-indices of the Risk Management Index (RMI): Disaster Management Index; and Risk Identification. The objective of the RMI is to measure the performance of a country's risk management.

The risks identified in the risk matrix appear reasonable and are classified as medium (5) and low (2). Risks include mitigation actions and compliance indicators.

## RESULTS MATRIX

**Objective:** To strengthen the national early warning system for tsunamis and riverine floods.

### EXPECTED IMPACT

Indicators	Unit of measure	Baseline		Intermediate measurements						Targets		Source / Means of verification	Comments
		Value	Year	Value	Year 1	Value	Year 2	Value	Year 3	Value	Year		
Disaster risk management index (RMI)	Index (0-100)	46.18	2013							49.78	2019	See Appendix A to the monitoring and evaluation plan.	See Appendix A to the monitoring and evaluation plan for details on the RMI. The baseline will be updated when the project is launched (2017).
Risk identification (RMI)		43.68	2013							45.26	2019		

### EXPECTED OUTCOMES

Indicators	Unit of measure	Baseline		Intermediate measurements						Targets		Source / Means of verification	Comments	
		Value	Year	Value	Year	Value	Year	Value	Year	Value	Year			
<b>COMPONENT 1: Strengthening of the national monitoring and forecasting network</b>														
Time taken to issue a tsunami alert, from time of earthquake to activation of the alert	Minutes	20	2016						12	2019	12	2019	Reports validated by the Office of Disaster Risk Management (SGR) based on a national simulation	Baseline (20 minutes): Estimated times based on simulations carried out by the SGR.
Watersheds for which at least one bulletin is issued that monitors flood risk in real time	Watersheds	0	2016			3	2018				3	2019	Technical report issued by the National Institute for Meteorology and Hydrology (INAMHI)	The flood monitoring service will be available in real time, which will contribute to a climate change adaptation strategy.

Indicators	Unit of measure	Baseline		Intermediate measurements						Targets		Source / Means of verification	Comments
		Value	Year	Value	Year	Value	Year	Value	Year	Value	Year		
<b>COMPONENT 2: Strengthening of the alert system and community response capacity</b>													
Coverage of the exposed population with access to the tsunami EWS increased <sup>1</sup>	Inhabitants	0	2016					1,034,929	2019	1,034,929	2019	Reports validated by the SGR	Source of information (inhabitants in each community): National census
Coverage of the exposed population with access to the riverine flooding EWS increased <sup>2</sup>	Inhabitants	0	2016					721,456	2019	721,456	2019	Reports validated by the SGR	Source of information (inhabitants in each community): National census
Population exposed to threats who participate in the evacuation exercises	Inhabitants	0	2016					300,000	2019	300,000	2019	Reports validated by the SGR	

<sup>1</sup> See paragraph 1.7 in the proposal for operation development for the definition of “access to the EWS.” In the case of tsunamis, the EWS involves the monitoring of threats by the IG-EPN; analysis of the probability of occurrence of a tsunami by INOCAR; a decision by the SGR regarding whether to activate the EWS; communication of the alert to the community using the ECU-911 sirens and other means of communication; assurance that the necessary channels for communication between the institutions and rescue workers are available; and the necessary community preparedness and training actions by the SGR.

<sup>2</sup> In the case of flooding, instead of the IG-EPN and INOCAR (seismic and tsunami observatories), the EWS involves the hydrometeorological monitoring elements for which INAMHI is responsible. The functions of the SGR and ECU-911 are the same in the case of tsunamis.



## OUTPUTS

Output	Unit of measure	Baseline	Year 1	Year 2	Year 3	Target	Comments
<b>Component 1: Strengthening of the national monitoring and forecasting network</b>							
Output 1.1. Threat monitoring system for riverine flooding (INAMHI), set up and in operation	System	0		1		1	This output will support the area of climate change and environmental sustainability, as the monitoring system will help to increase the country's knowledge of how to prepare for risks stemming from climate change.
Benchmark 1. Automated hydrological stations, installed and in operation	Station	27		16		43	16 stations in 3 watersheds: Chone, Portoviejo, and Chongón (8 to strengthen existing stations and 8 new ones).
Benchmark 2. Satellite earth station (GOES-R), installed and in operation	Station	0		1		1	There is a station currently, but this will be replaced as a change of satellite will render it obsolete.
Benchmark 3. Probabilistic flood threat maps, modelled and generated for the targeted watersheds	Maps	0	3			3	Three watersheds: Chongón, Chone, and Portoviejo
Benchmark 4. Hydrological data storage and processing equipment, installed and in operation	IT server	0		2		2	
Output 1.2. Earthquake threat monitoring system (IG-EPN), set up and in operation	System	0	1			1	
Benchmark 1. Equipment to strengthen monitoring capacity, installed in the targeted area	Units of equipment	184		8		192	18 pieces of equipment as the program output (10 to strengthen existing seismographic and accelerographic stations and 8 new ones)
Benchmark 2. Equipment to strengthen the new monitoring center, installed	Units of equipment	0		3		3	1 visualization system and 2 servers
Output 1.3: Tsunami threat monitoring system (INOCAR), set up and in operation	System	0		1		1	
Benchmark 1. DART buoys with fourth-generation capacity, installed	Units of equipment	0			2	2	
Benchmark 2. Radar system for the coastline, installed	Units of equipment	0		1		1	To be installed in La Libertad (province of Santa Elena) or Manta (Manabí)

Output	Unit of measure	Baseline	Year 1	Year 2	Year 3	Target	Comments
Benchmark 3. Marine stations, upgraded (automated)	Stations	0		8		8	
Output 1.4: National collective simulation, completed	Simulation	0	1	1	1	3	
Benchmark 1. Simulation-based testing of monitoring systems, completed	Simulation	0	1	1	1	3	Annual national simulation, led by the SGR
Benchmark 2. National EWS communication protocol, revised and/or updated	Protocol	0	1	1	1	1	Revised annually
<b>Component 2: Strengthening of the alert system and community response capacity</b>							
Output 2.1. EWS siren units with security camera with connectivity (ECU-911), installed	Communities	74		45		119	In four provinces (Santa Elena, Guayas, El Oro, and Galápagos)
Output 2.2. Communications network between ECU-911 and fire departments at the provincial level	Provinces	2		4		6	Fire departments in the provinces of Guayas, Santa Elena, El Oro, and Galápagos. Includes communications equipment and configuration thereof
Output 2.3. Preparation of communities to respond and evacuate in the case of occurrence (SGR), completed	Communities	55	39	20		114	40 for tsunami EWS, 5 for riverine flooding EWS, and 14 where sirens were installed in the previous, government-financed phase
Benchmark 1. Signage and lighting installed	Communities	55	39	20		114	
Benchmark 2. Flood maps validated	Maps	55	39	20		114	
Output 2.4: Community awareness-building (SGR) completed	Communities	0	60	59		119	45 from the program and 74 from the previous, government-financed phase
Benchmark 1. Communications campaign for the 6 provinces in the program	Communication campaign messages	0	1	1	1	3	Mass communications. Gender perspective will be taken into account, and attempts will be made to adjust activities to achieve appropriate participation by women.
Benchmark 2. Community emergency preparedness committees organized	Community committees	0	60	59		119	
Benchmark 3. Community contingency plans, drills, and simulations completed	Communities	0	60	59		119	
Benchmark 4. Local EWS communication protocols prepared	Protocols	0		2		2	Protocols for the tsunami EWS and the riverine flooding EWS

## FIDUCIARY AGREEMENTS AND REQUIREMENTS

<b>Country:</b>	Ecuador
<b>Project number:</b>	EC-L1221
<b>Name:</b>	Program to Strengthen the National Early Warning System
<b>Executing agency:</b>	ECU-911 Integrated Security Service
<b>Prepared by:</b>	Marcela Hidrovo and Gumersindo Velázquez (FMP/CEC)

### I. SUMMARY

- 1.1 The institutional evaluation for fiduciary management of the program was based on (i) the country's fiduciary context; (ii) the results of a fiduciary risk assessment; (iii) analysis of ECU-911 institutional capacity; and (iv) input from meetings with the entities involved in project execution. As a result, the following fiduciary agreements on procurements and financial management have been prepared for program execution.

### II. THE COUNTRY'S FIDUCIARY CONTEXT

- 2.1 The country's fiduciary context has improved substantially since 2008, as demonstrated by recent evaluations, done using internationally recognized methodologies, of the public procurement system (MAPS-2011) and the financial management system (PEFA-2014, repeat assessment, in the final stages as of the writing of this document).
- 2.2 **Procurement system.** On 25 February 2013, the Bank's Board of Executive Directors approved the use of the National Public Procurement System for procurements below the threshold for international competitive bidding (below US\$3,000,000 in the case of works, US\$250,000 in the case of goods and services, and US\$200,000 in the case of consulting firms). The Bank's policies on procurement and consultants apply in all other cases.
- 2.3 **Financial management system.** Since January 2008, government entities have been using the eSIGEF financial administration system, which integrates budget, accounting, treasury, and electronic payment processes, a centralized information system, and the use of online technology. Central government entities are subject to control and supervision by the supreme audit entity, the Office of the Comptroller General (CGE). The country systems for financial management are adequate, but for the Bank's purposes they need to be supplemented in the areas of specific financial reporting and external auditing (performed by a firm eligible for Bank-financed projects).

### **III. THE EXECUTING AGENCY'S FIDUCIARY CONTEXT**

- 3.1 The ECU-911 Integrated Security Service is the executing agency and coordinator for the program, with technical support from the government entities that make up the national early warning system (EWS): National Institute for Meteorology and Hydrology (INAMHI); Office of Disaster Risk Management (SGR); Geophysics Institute at the National Polytechnic School (IG-EPN); and Army Oceanographic Institute (INOCAR).
- 3.2 The proposed program (EC-L1221) provides continuity to the "Early Warning System for Tsunamis and Dam Control" financed by the Ecuadorian governments, which ECU-911 has been executing satisfactorily. This initial phase is mandated under Decree 1001 of the declaration of a state of emergency, and it is included in the corresponding annual investment plan. Given that the state of emergency has ended, the program requires a priority designation by the National Planning and Development Department (SENPLADES). ECU-911 has an adequate legal and regulatory framework for full execution of the activities under the second phase of the program; however, the organization lacks experience executing Bank-financed projects.
- 3.3 ECU-911's specific responsibilities will be as follows: (i) performing general and financial administration of the program, ensuring the efficient management of loan and local counterpart resources; (ii) planning and monitoring program execution, including preparing annual work plans and meeting pre-established targets; (iii) planning, executing, and monitoring procurement processes and the installation of equipment and technical services, ensuring conformity with the Bank's procurement policies; (iv) ensuring compliance with the delivery of products to beneficiary entities; (v) preparing and processing the corresponding payments; (vi) maintaining a satisfactory accounting and financial system for recording financial transactions using program funds, preparing financial statements, and processing disbursement requests; (vii) hiring an audit firm eligible for Bank-financed projects based on terms of reference agreed upon with the Bank; (viii) preparing semiannual program progress reports and delivering them to the Bank; and (ix) coordinating with the other entities indicated in paragraph 3.1, as well as other tasks as determined in the program Operating Manual.
- 3.4 The INAMHI, SGR, IG-EPN, and INOCAR will be responsible for: (i) preparing the technical specifications for procurements for their organizations; (ii) participating in the technical selection committees; (iii) evaluating and adjudicating contracts and accepting the final deliverables thereunder by approving them in a timely manner.

### **IV. FIDUCIARY RISK EVALUATION AND MITIGATION ACTIONS**

- 4.1 The following fiduciary risks were identified based on the risk workshop and using available information regarding the program. They are included in the risk matrix indicated in paragraph 2.3 of the loan proposal:
  - a. Financial fiduciary risks (medium level) are related to possible delays by the Ministry of Finance in allocating local counterpart funds to the executing agency. This could be a result of delays in obtaining the necessary requirements for securing the allocations, or external issues related to liquidity

management by the country. The main procurement-related fiduciary risks (medium level) are related to possible delays in contracting processes. This could be a result of, among other things, delays in obtaining priority designations, budget certifications, guarantees, and other necessary national precontractual processes; lack of familiarity with IDB procurement policies on the part of ECU-911; and a limited procurement team at the ECU-911.

- b. The actions defined to mitigate the fiduciary risks have reduced the probability that the latter will materialize and are as follows: (i) training the executing agency's program management team in the Bank's procurement policies and formats; (ii) strengthening the program management team where necessary; and (iii) holding meetings with senior and operational staff at SENPLADES and the Ministry of Finance to facilitate precontractual processes.
- c. ECU-911 has appointed a program management team to execute the program, consisting of a general coordinator and the respective counterparts for planning, procurement, and finance with the technical and management skills necessary to execute program outputs. However, the program management team is not exclusively dedicated to the program, and its current workload is high.

## V. CONSIDERATIONS FOR THE SPECIAL PROVISIONS OF CONTRACTS

- 5.1 Some considerations: Approval of the program Operating Manual, including the following: (i) a program management team that includes at least one full-time financial specialist and one full-time procurement specialist; (ii) the presentation of evidence of priority designations and inclusion in the annual investment plan, as well as budgetary allocations for each executing agency and/or subexecuting agency to cover program execution for at least the first calendar year; and (iii) interagency agreements (where applicable).

## VI. AGREEMENTS AND REQUIREMENTS FOR PROCUREMENT EXECUTION

- 6.1 **Execution of procurements.** The executing agency is expected to use the online procurement plan execution system (SEPA). The initial procurement plan will cover the first 18 months, and it will be updated annually, or as necessary, using the SEPA.
  - a. **Procurement of works, goods, and nonconsulting services (Policies for the procurement of goods and works financed by the IDB, document GN-2349-9).** The threshold for international competitive bidding (ICB) will be made available to ECU-911 at [www.iadb.org/procurement](http://www.iadb.org/procurement). Program-related goods and nonconsulting services subject to international competitive bidding ICB will be procured using the standard bidding documents issued by the Bank. Items subject to national competitive bidding (NCB) and shopping will be procured using documents agreed with the Bank.
  - b. **Shopping** may be used for works contracts in amounts of less than US\$3 million and for goods and services in amounts of less than US\$250,000. This is an appropriate method for procuring readily available off-the-shelf

goods, standard specification items of low value in bulk, or simple civil works of low value.

- c. **Direct contracting.** No direct contracting is anticipated in the procurement plan. However, procurements using this method may arise in the course of execution, and this will be handled pursuant to the procurement policies, as well as policy document OP-272-2 containing operational guidelines for procurements.
  - d. **Minimum period for competitive bidding.** For both international and national competitive bidding, the period between publication of the call for tenders/expressions of interest, respectively, will be no less than four calendar weeks.
  - e. **Selection and contracting of consulting services (Policies for the selection and contracting of consultants, document GN-2350-9).** For the selection and contracting of consulting services, any of the methods described in the policies on consulting services may be used, as long as the method has been identified in the procurement plan approved by the Bank. The plan may be updated. The threshold for the inclusion of international consultants in short lists will be made available to the program at [www.iadb.org/procurement](http://www.iadb.org/procurement). Contracts with consulting firms under the program will be executed using the standard request for proposals issued by the Bank.
  - f. **Selection of individual consultants.** Individual consultants will be contracted in accordance with document GN-2350-9, Section V, paragraphs 5.1 to 5.4.
  - g. **Training.** The procurement plan describes items for procurement, including any training that is engaged as a nonconsulting service.
  - h. **Use of the country procurement system.** N/A
  - i. **National preference.** In the case of contracts subject to ICB, bids for goods originating in the borrowing country will have a price preference equivalent to 15%.<sup>1</sup>
  - j. **Recurrent costs.** The following operating and maintenance costs required for program operation may be financed using Bank funds: travel, per diem, transportation, office maintenance, postage, stationery and office supplies, maintenance of machinery and equipment, insurance, training, graphic art products, printing, publications and copies, equipment rental, and minor expenses required for the operation of the central executing unit. These will be processed in accordance with the administrative procedures set out in the MEEP, which is subject to the Bank's no objection.
  - k. **Advance procurement.** No advance procurement is planned.
  - l. **Other.** No expenses other than those included in the procurement plan are anticipated.
- 6.2 Thresholds for international competitive bidding and shortlists with international participants.

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<sup>1</sup> Policies for the procurement of goods and works financed by the IDB (document [GN-2349-9](http://www.iadb.org/procurement)), Appendix 2, and the loan contract.

**Table VI-1. Table of thresholds (US\$)**

Works	Goods	Consulting services
ICB	ICB	International advertising, consulting services
≥3,000,000	≥ 250,000	≥200,000

- 6.3 As part of the fiduciary agreements and requirements, the main procurements are the responsibility of the executing agency. The most important procurements under the program will be prepared using the information generated to prepare the procurement plan, a joint effort of the executing agency, the procurement and technical units of the institution leading the project, and the sector specialist, who will ensure that the procurements are consistent with the fulfillment of program outcomes and outputs.

**Table VI-2. Main procurements**

Activity	Procurement method	Estimated date of consulting contract/invitation	Estimated amount (US\$)
<b>1.- Goods</b>			
DART buoys with fourth-generation capacity, plus spare parts	ICB	July/2017	2,850,000.00
Specialized communication equipment	ICB	May/2017	1,883,703.47
Signage for meeting points and evacuation routes	ICB	June/2017	2,066,000.00
EWS siren equipment and security cameras	ICB	May/2017	4,052,802.60
Communications campaign	ICB	Nov/2017	293,000.00
<b>2.- Consulting firm services</b>			
Audit	QCBS	Sept/2017	51,300.00

- 6.4 **Procurement supervision.** The contracts subject to ex post review by the Bank will be those listed below, which will be handled pursuant to Appendix 1 of the respective policies. For amounts equal or greater to those stipulated in the table, contracts will be subject to ex ante supervision. Ex post review visits will be carried out by the Bank at least once every 12 months and will include at least one physical inspection visit where appropriate.

**Table VI-3. Threshold for ex post review (US\$)**

Works	Goods	Consulting services	Individual consultants
< 3,000,000	<250,000	< 200,000	< 50,000

Note: Ex post review limits are applied as a function of the executing agency's fiduciary capacity. They may be modified by the Bank as a result of changes in fiduciary capacity.

- 6.5 **Special provisions.** Measures to reduce the likelihood of corruption: the provisions of documents GN-2349-9 and GN-2350-9 will be observed with respect to prohibited practices (lists of companies and individuals that are ineligible to work with multilateral agencies).
- 6.6 **Records and files.** The co-executing agencies will maintain updated records and duly organized files, with documentation on procurement and contracting kept in a single file or folder in which processes financed with local counterpart resources or with program resources are easily distinguishable.

## VII. FINANCIAL MANAGEMENT AGREEMENTS AND REQUIREMENTS

- 7.1 **Programming and budget.** The Code of Public Finance and Planning establishes the general rules governing budget programming, formulation, approval, execution, control, evaluation, and settlement. These general rules are applied to the execution of Bank-financed programs. The SIGEF integrated system implements and standardizes the application of these general rules throughout the national public administration. The program budget will be calculated based on the project execution plan and annual work plan agreed upon between the Bank and the executing agency and will serve as the basis for formal inclusion in the institution's general budget, which is in turn included in the draft budget submitted for legislative approval.
- 7.2 ECU-911 will arrange disbursements and budgetary allocations for the program, and it will perform budget execution control every four months using its internal systems.
- 7.3 **Accounting and information systems.** Government accounting is done through the eSIGEF system, which is configured according to the government chart of accounts and the budget classifications issued by the Ministry of Finance. Although eSIGEF currently enables the preparation of reports related to funds provided by the IDB, the reports do not cover the specific information that is required in sufficient breadth or depth, meaning that separate reports covering project status and progress are required.
- 7.4 Details of the functions of the executing agency and the members of the program management team will be provided in the program Operating Regulations.
- 7.5 In the case of this program, the Bank will accept program accounts prepared on a cash basis.
- 7.6 **Disbursements and cash flow.** In 2008, the Ecuadorian government introduced the unified treasury account mechanism, which unified treasury management for all central government entities.
- 7.7 Implementation of the mechanism did not eliminate the system of special or specific purpose accounts, which are held at the Central Bank of Ecuador for the purposes of receiving the proceeds of multilateral loans, including IDB loans. Accordingly, ECU-911 will open an exclusive account at the Central Bank of Ecuador to receive proceeds from the program loan. All program payments will be executed through the eSIGEF financial administration system through debits from the unified treasury account.



- 7.8 Program disbursements will be made in the form of advances of funds in accordance with the program's real liquidity needs, based on a financial plan reflecting real funding needs over a maximum period of six months. Financial plans will be prepared at project launch and will be updated based on execution progress. Cash flow programming will be consistent with project execution plans, annual work plans, and procurement plans that have received the Bank's no objection and should cover a moving horizon of at least 12 months. At the borrower's request, the Bank may also make direct payments to suppliers.
- 7.9 Each disbursement request submitted to the IDB by the executing agency will be accompanied by the financial plan, program cash flow, and a reconciliation of available funds. Reports on advances of funds will comply with the provisions of policy document OP-237-6, on financial management guidelines for IDB-financed projects. Disbursements will be accounted for in the next disbursement request once at least 80% of the balance of fund advances has been executed.
- 7.10 The supporting documentation for expenditures or payments made by each source will be subject to ex post review following the disbursement of funds by the Bank.
- 7.11 **Internal control and auditing.** Ecuador's Constitution identifies the Office of the Comptroller General (CGE) as the lead agency for the system of public sector controls. As part of the public sector, ECU-911 has its own internal audit unit that is directly attached to the CGE. The Bank will not use its services, however, as its audit plans do not include review of the program. ECU-911 will include the main internal control processes necessary to ensure that controls are working properly.
- 7.12 **External control and reports.** Given that the CGE lacks sufficient capacity to exercise external control over projects financed by external loans, external auditing will be carried out by independent, first-tier auditors acceptable to the Bank (international audit firms), in accordance with IDB requirements and the provisions of policy document OP-273-6. The firm will be contracted by ECU-911 using loan proceeds, via a competitive process based on terms of reference previously approved by the IDB. During execution, ECU-911 will submit audited program financial statements on an annual basis, within 120 days after the close of each fiscal year, including validation of the internal operational processes and controls implemented by the agency.
- 7.13 There is no national policy governing public disclosure of audit reports; however, audited program reports will be published in Bank systems pursuant to the current policy on access to information and disclosure.
- 7.14 **Financial supervision.**<sup>2</sup> The initial financial supervision plan is based on the risk evaluations mentioned in paragraph 4.1.

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<sup>2</sup> See Annex I to document OP-273-6: Application of Financial Management Principles and Requirements (Requirement 4 – Financial Supervision).

**Table VII-1. Financial supervision of the program**

Supervision activity	Supervision plan			
	Nature and scope	Frequency	Responsible party	
			Bank	Other
Operational	Review of the progress report	Semiannual	Fiduciary and sector team	
	Portfolio review with the executing agency	Consistent with Ministry of Finance requirements	Fiduciary and sector team	
Financial	Review of cash flow and disbursement projections	With each request for advance of funds. Where required by project circumstances.	Fiduciary and sector specialists	Executing agency
	Inspection visits	Annual	Fiduciary specialist	Consultant/ auditor
	Review of audited and unaudited financial statements	Annual	Fiduciary specialist	Consultant/ auditor
	Review of financial audit reports	Annual	Fiduciary and sector specialists	Executing agency/ external auditor
Procurement	Ex ante and ex post procurement review	During project execution	Project Team Leader/executing agency	Executing agency
	Update of procurement plan	Annual	Project Team Leader/executing agency	Executing agency
Compliance	Compliance with conditions precedent	Once	Fiduciary team/ Project Team Leader/operations analyst	Executing agency
	Review of prioritization and budget allocation	Annual, June and January of each year	Fiduciary specialist/ Project Team Leader/operations analyst	Executing agency/ SENPLADES/ Ministry of Finance
	Delivery of audited financial statements	Annual	Project Team Leader and fiduciary specialist	Executing agency/ external auditor

- 7.15 **Execution mechanism.** As the executing agency, ECU-911 is responsible for financial administration and internal control, with technical support from the INAMHI, SGR, IG-EPN, and INOCAR teams.
- 7.16 Within ECU-911, the IDB project management unit will lead execution of the program, as well as commission and review studies as necessary, with support from the respective units within the institution (Treasury, Budget, etc.).
- 7.17 As the executing agency, it will be responsible for establishing mechanisms and procedures for activities including the following: (i) prioritizing eligible expenditures to be financed using program funds; (ii) keeping orderly accounts and physical

- documentation as required by the Bank to verify eligible expenditures funded and effectively paid, which will be subject to external audit; (iii) ensure compliance in the delivery of products to beneficiary entities; and (iv) submit to the Bank a consolidated report on the appropriate use of loan proceeds.
- 7.18 ECU-911 will periodically provide the supporting documentation, including physical versions (copies) and/or electronic versions, with the content, format, and time horizons to be agreed upon between the parties. It will also keep an orderly and complete file of the original supporting documentation for expenditures that have been executed and duly paid, in order to enable the rapid identification and presentation of documents for post review during the external audit mentioned in paragraph 7.12.
- 7.19 The execution mechanism for the program will be described in detail in the Operating Regulations, along with composition of the program management teams, the responsibilities of each entity, and the registration, communication, and reporting processes governing collaboration between suppliers and executing agencies.
- 7.20 [Procurement plan](#).

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-\_\_\_/17

Ecuador. Loan \_\_\_/OC-EC to the Republic of Ecuador  
Program to Strengthen the National Early  
Warning System

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Republic of Ecuador, as Borrower, for the purpose of granting it a financing to cooperate in the execution of a program to strengthen the National Early Warning System. Such financing will be for the amount of up to US\$12,447,779 from the resources of the Bank's Ordinary Capital, and will be subject to the Financial Terms and Conditions and the Special Contractual Conditions of the Project Summary of the Loan Proposal.

(Adopted on \_\_\_\_\_ 201\_)