TC Document

I. Basic Information for TC

▪ Country/Region:	Regional
▪ TC Name:	Study on Disaster Risk Management – A macro perspective cost-benefit analysis for reducing vulnerability
▪ TC Number:	RG-T3369
▪ Team Leader/Members:	Tsuneki Hori (CSD/RND), Team Leader; Sergio Lacambra, Ginés Suarez, Yuri Chakalall, Roberto Guerrero, Maria del Rosario Frugone (CSD/RND); Juan Jose Durante and Annabella Gaggero (IFD/CMF); Maricarmen Esquivel (CSD/CCS); Carolina Veríssimo (LEG/SGO)
▪ Taxonomy:	Research and Dissemination
▪ Date of TC Abstract authorization:	February 7, 2019
▪ Beneficiary:	IDB's borrowing member countries
▪ Executing Agency and contact name:	Inter-American Development Bank (IDB)
▪ Donors providing funding:	Multidonor Disaster Prevention Trust Fund (MDP) - US$200,000 OC Strategic Development Program for Sustainability (SUS) - US$600,000
▪ Total Funding Requested:	US$800,000.00
▪ Disbursement period:	24 months
▪ Required start date:	March 2019
▪ Types of consultants:	Consulting firm and individual consultants
▪ Prepared by Unit:	Environment, Rural Development and Disaster Risk Management Division (CSD/RND)
▪ Unit of Disbursement Responsibility:	Climate Change and Sustainable Development Sector (CSD/CSD)
▪ TC Included in Country Strategy: ▪ TC included in CPD:	N/A N/A
▪ The Update to the Institutional Strategy (UIS) 2010-2020:	Productivity and innovation; Sustainability and climate change

II. Objectives and Justification of the TC

2.1 **Objective:** The general objective of this Technical Cooperation (TC) is to support the Bank's borrowing member countries to make more effective and systematic public-investment decisions for reducing vulnerability to natural hazards (including climate change-related hazards). The expected product of this TC is a decision guidance tool (or an engineering-based public financial decision guidance tool) to simulate optimal public investment decision-making between available combinations of structural and non-structural measures[1] and financial protection instruments[2] for vulnerability reduction/resilience building. The expected result from the TC is that borrowing member countries of the Bank are aware on the most effective combination of structural, non-structural and financial protection measures in cost-benefit terms so

[1] Structural measures include, for example, construction of protection infrastructures (e.g., river dikes) and structural retrofitting interventions of existing buildings to reduce earthquake risk. Non-structural measures include, for example, installation of early warning system to quicken citizens evacuating prior to occur disasters.

[2] These includes, for example, the Bank's Contingent Loan for Natural Disaster Emergencies to provide quick liquid resources for emergency assistance and infrastructure rehabilitation.

as to better guide their future development planning decisions in order to reduce vulnerability to natural hazards.

2.2 **Background:** Based on the Disaster Risk Management (DRM) Policy (OP-704), specially its Directive A1: *Risk Management through Programing and Operations*, the Bank has developed several technical instruments to support member countries in reducing vulnerability to natural hazards.[3] These technical instruments include: (i) The Disaster Risk and Risk Management Indicators[4]; (ii) The Country Disaster Risk Profile (hereafter, Risk Profile)[5]; and (iii) The recently initiated Country Investment Profile on Disaster Risk Reduction (hereafter, Investment Profile). These technical inputs are being used primarily for sector/policy dialogues with the member countries to support identifying countries' vulnerable sectors/areas to natural hazards, as well as promoting proactive actions for reducing the vulnerabilities. As a result, over the last three years (2015-2018), 14 loan programs on DRM have been requested from the Bank, including five Investment loans, three Policy Based Loans (PBLs) and six Contingent Credit Facilities (CCFs).[6]

2.3 The Investment Profile, the principal subject of this TC, is an innovative tool whose development was initiated in 2015 by the Bank. The tool aims to analyze the effectiveness of ex-ante disaster risk reduction investment measures (including climate change adaptation) and financial protection options through computer-based comparative simulations, both at national and sub-national level. The general idea of this tool is to help the LAC region to make progress on priorities discussed and agreed during the UN's Third World Conference on Disaster Risk Reduction in 2015 in Sendai, Japan,[7] namely "*the developing countries all over the world require financial decision support tools to estimate, in a quantitative manner, cost and benefit of available investment measures for reducing disaster risk in the period 2015 - 2030*[8]*".* Through the Technical Cooperation RG-T2434: Development Profile Public Investment in Disaster Risk Reduction, the IDB pioneered the first model in the world to respond to this priority. With that TC, the methodology of the tool was developed, and pilot studies were conducted in three member countries at national level (Peru, Bolivia and Honduras) and one at local level (Rio Rocha River-basin in Bolivia). These products were discussed with several specialized international organization[9] and were utilized

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3 Natural hazards include flooding, hurricanes, earthquakes, droughts. Additional magnitude (in both frequency and intensity) due to climate change is included as the concept of the natural hazards in this document, especially for the climate related hazards.

4 Includes four indicators: the Disaster Deficit Index (DDI); the Local Disaster Index (LDI); the Prevalent Vulnerability Index (PVI) and the Risk Management Index (RMI) – See https://publications.iadb.org/en/publication/16713/ and an additional index: Index of Governance and Public Policy in Disaster Risk Management (iGOPP) – see https://publications.iadb.org/en/publication/16887/igopp-index-governance-and-public-policy-disaster-risk-management. The original four indicators have been, and the iGOPP is in the process of being applied in all 26 Bank member countries.

5 This instruments estimates Probable Maximum Loss (PML) and Annual Average Loss (AAL) to eventual hazard events – see example: https://publications.iadb.org/en/publication/12031/disaster-risk-profile-jamaica. The Risk Profile has been developed for 14 countries to date.

6 These include the investment loans: BL-1028, BO-L1188, BH-L1043, HO-L1179 and EC-L1221; policy-based loans: BO-L1104, BO-L1107 and JA-L1081; CCFs: DR-X1011, EC-X1014; JA-O0003; BH-O0003; SU-O0005 and AR-O0008.

7 The Third World Conference on Disaster Risk Reduction was held in Sendai Japan in 2015. More than 150 countries participated, including all IDB member countries.

8 For example, to allocate US$X millions or US$Y millions of public budgets for reducing 20% or 30% of potential flood or earthquake risk over specified time periods e.g. from 2020 to 2030.

9 Including, among others, the International Institute for Applied Systems Analysis (IIASA) in Austria.

and disseminated as reference materials for the sector dialogues with the three pilot countries.

2.4 Thanks to the progress made with the TC RG-T2434, several challenges and lessons were identified during its implementation, which are to inform the scope of the study proposed for the current TC. The challenges manly include the following:

a. **Tool methodology**: (i) globally, it is necessary to expand a **more comprehensive database** that includes data related to past investment projects measures (in terms of their objective, costs, performances and benefits in order to simulate and determine an effective combination and composition of future public investments for reducing vulnerability).[10] The current database, developed with the previous TC, is still limited as it only considers some representative vulnerability reduction/financial instrument measures;[11] (ii) **More refined analyses** should be carried out for upcoming studies considering both sector specific investment purposes (e.g., transportation, housing, hospital) and territorial based development purposes (e.g., at a critical coastal area or a whole river-basin area), while it is also important to differentiate between public and private responsibilities; (iii) **Indirect disaster loss estimation modeling** is also an important aspect to incorporate based on past experiences, e.g. for the 1985 Mexico earthquake it was found that the indirect losses were 11 times more than the direct infrastructure losses.[12] Even though the indirect loss estimation model is incorporated in the current tool, it is still incipient, as it only assigns one parameter[13] and can be strengthened by improving considerations of hazard type, socio-economic conditions, and DRM policy progress; and (iv) **Climate change scenarios** are another important aspect to incorporate in the study, so as not to underestimate its additional impacts. As significant progress has been made, since the previous TC was implemented in 2014-2016, by the international climate change scientific community in the development of future climate projections, these new findings should be incorporated in the study.

b. **Country Coverage.** The tool will gain in robustness as it is applied in additional countries where considerable vulnerabilities exist. As already mentioned, the previous TC was only implemented in three countries.

c. **Knowledge sharing and disseminations.** Results of the previous study will shortly be available as Technical Notes at the Bank´s Knowledge Portal. For broader dissemination and a more interactive knowledge sharing with member countries and other regions of the world, a user-friendly and easy-to-access web database is needed.

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[10] The database should include: (i) conventional protection measures (e.g., concrete seawalls, river dikes, building retrofitting, drainage systems etc.); (ii) nature-based infrastructure options (e.g., planting mangroves in the coastal area for reducing coastal floods); and (iii) and non-structure measures (e.g. early warning systems).

[11] The current database includes: (i) Retrofitting measures to reduce earthquake risk for constructions; and (ii) river dike constructing for reducing food risk only.

[12] Wisner, B., Blaikie, P., Cannon, T., and Davis, I. (2003). At Risk: natural hazards, people´s vulnerability and disasters. Routledge, New York, 2nd edition.

[13] Based on available literature, under the current model the indirect losses are assumed to be twice the direct losses if the hazard return period is higher than 50 years.

2.5 **Justification of this TC.** The investment decision-making tool emerging from this TC, based on engineering experiences and computer simulations, complements the rest of the DRM-related technical instruments developed by the Bank (see paragraph 2.2). It is expected that the outputs of this TC, together with the other Bank related DRM related studies, will contribute to deepen sector/policy dialogues with member countries for promoting more effective and improved decision-making processes for incorporating disaster risk reduction and climate change adaptation into sustainable development planning.

2.6 **Alignment with Bank's sector priorities:** The main purpose of the TC is to develop an innovative engineering-based public financial decision-making tool for identifying the best combinations of structural, non-structural and financial protection options for reducing disaster and climate change risk. The TC is therefore consistent with the Update to the Institutional Strategy (UIS) 2010-2020 (AB-3008) and is aligned with the development challenge of (a) productivity and innovation. Additionally, it is also aligned with the cross-cutting theme of: climate change and environmental sustainability.

2.7 This TC is also aligned with one of the objectives of the Ordinary Capital Strategic Development Program for Sustainability: Strengthen capacities to manage disaster risk and respond to emergencies stemming from disasters (GN-2819-1); and with one of the uses of the resources and activities of the Multidonor Disaster Prevention Trust Fund: Project preparation costs for disaster prevention loans or disaster prevention components in sector loans (GN-2427-2).

III. Description of activities/components and budget

3.1 This TC has the following three components, designed to address all the challenges explained in paragraph 2.4(a) – (c):

3.2 **Component I: Improving the tool methodology.** The focus of this component is to improve and update the currently existing Investment Profile methodology addressing the challenges and considering the lessons described in paragraph 2.4(a). The main activities financed under this component include: (i) enhancing - the database to manage data related to the investment measures compiled worldwide; (ii) analyzing risk reduction and financial protection combinations from a cost-benefit perspective, using the enhanced database and simulations when real data is unavailable; and (iii) conducting an in depth analysis of the relationship between direct and indirect losses in order to determine different ratios depending on specific scenarios. The main results of these activities will be considered to update the tool methodology. Several peer-reviewers (including international high-level academics in the field) will be hired to review the updated methodology. Following this, consultants will develop a software to operationalize the tool methodology. The main product of this component will be the improved tool methodology operationalized through a software. A technical note with the improved methodology will be published in the Bank´s knowledge web portal.

3.3 **Component II: Country studies.** The updated model (developed in Component I) will run combinations of simulated structural and non-structural risk reduction measures and other financial protection instruments, at national and/or sub-national levels. Optimal combinations will be identified per case study based on an analysis of the costs and benefits of the different alternatives. A minimum of four countries, ideally

from all four region groups of the Bank (The Country Department Caribbean: CCB, The Country Department Central America, Mexico, Panama and Dominican Republic: CID, the Country Department Southern Cone: CSC and The Country Department Andean Group: CAN) will be selected as study countries;[14] based on (i) country´s interest in resilience-related solutions; (ii) IDB priorities based on the Country Strategies; and (iii) future opportunities for resilience investment lending. The model will run at the national and/or sub-national territorial scales, depending on the country needs. Pre-feasibility studies (including the cost-benefit analysis) at lower scales (e.g. project scale) will also be conducted in cases where there is high potential for resilience investment lending in the short/medium term. Sector dialogues will be organized with the pilot countries. Consulting firms will be hired to undertake the country studies, including field data collection within the selected countries. As a result of this component country study reports will be published through the Bank knowledge web portal as technical notes.

3.4 **Component III: Dissemination.** This component will expand the Bank´s DRM knowledge repository "RiskMonitor"[15] to include, as an additional module of this platform the knowledge developed through this TC (including the tool methodology, the data and the country studies) and TC RG-T2434. Individual consultants and consulting firms will be hired to undertake this task. Additionally, this component includes national workshops in the selected countries to disseminate the results of this TC to national authorities/stakeholders, including the Ministries of Finance, public planning institutions, ministries of public works and DRM agencies.

3.5 **Expected results.** The expected results of this TC are the following:

a. **Component I:** Updated tool methodology (in the form of both a software and a technical note), including (i) the enhanced database; (ii) the cost-benefit analysis of different risk reduction and financial protection combinations; and (iii) an improved model on the relation between direct and indirect disaster losses.

b. **Component II:** (i) minimum four country studies (technical notes), with at least one of them including a pre-feasibility study of a resilience investment program at an appropriate scale; and (ii) sector dialogues in the study countries.

c. **Component III:** (ii) Updated RiskMonitor (web-based information platform); and (ii) national workshops.

3.6 The total amount of financing required is eight hundred thousand US dollars (US$800,000), with two hundred thousand US dollars (US$200,000) to be drawn from the Multi-donor Disaster Prevention Fund (MDP) and six hundred thousand US dollars

[14] Preliminary discussions with the COFs, Sector specialists and government offices during the project preparation allow defining possible study countries that may include: (i) Barbados in some specific coastal area to reduce the coastal climate risk; (ii) Dominican Republic at national level to optimize mitigation measures and financial instruments for reducing vulnerability/resilience building due to earthquakes and other climate events; (iii) Ecuador, both at national level and sector level, specifically in transportation (roads) in the southern region of the country; and (iv) Uruguay to reduce drought risk specifically in the agriculture and livestock.

[15] RiskMonitor is a Bank´s web portal that is repository of the data/info generated by IDB studies related to Disaster Risk Management. The system currently displays a beta version which will to be replaced by a full version during 2019.
See: https://riskmonitortest.iadb.org/wmsfiles/products/datasets/riskmonitor?lang=en

(US$600,000) from OC Strategic Development Program for Sustainability (SUS) Fund. No counterpart funding is envisaged.

Indicative Budget (US$)

Components/Activities	BID-MDP	BID-SUS	Total Funding
Component I: Improving study methodology.	**0**	**188,000**	**188,000**
a) Data recompilation, database enhancement and study on general relation between costs and benefits: US$98,000.	0	98,000	98,000
b) Study on relation between direct and indirect losses:US$20,000	0	20,000	20,000
c) Consultant for complying and updating the study methodology:US$20,000	0	20,000	20,000
d) Peer-reviews for quality control:US$20,000 x 2 = US$40,000	0	40,000	40,000
e) Software: US$10,000	0	10,000	10,000
Component II: Country studies.	**200,000**	**349,000**	**549,000**
a) Country studies (minimum four): US$130,000 x 4 = US$520,000.	200,000	320,000	520,000
b) Peer-reviews for quality control: US$12,500 x 2 = US$25,000	0	25,000	25,000
c) Sector dialogues: US$1,000 x 4 = US$4,000	0	4,000	4,000
Component III: Dissemination.	**0**	**63,000**	**63,000**
a) Updating RiskMonitor: US$55,000	0	55,000	55,000
b) National workshops: US$2,000 x 4 = US$8,000	0	8,000	8,000
TOTAL	**200,000**	**600,000**	**800,000**

IV. Executing agency and execution structure

4.1 The Bank, through the Environment, Rural Development and Disaster Risk Management Division (CSD/RND) will be the executing agency for this TC. CSD/RND will be responsible for overall execution of the activities related to this TC in close coordination with the selected countries. CSD/RND will coordinate closely with the respective Bank's Country Offices (COF), including RND specialists in COFs, as a means to increase trustful institutional relationship and partnerships among the national stakeholders, COFs and CSD/RND. The Investment Profile is developed using an innovative methodology and is a study that the Bank will own. Member countries do not always have sufficient technical capacity to render quality control of all the activities programed in this TC.

4.2 **Non-objection letters.** Prior to the commencement of any activities financed by this TC in a borrowing member country, the Bank will obtain the corresponding non-objection letter from the official liaison entity of the Bank in the respective country.

4.3 Procurement: The Bank will contract individual consultants, consulting firms[16] and non-consulting services. The activities to be executed under this TC are included in the Procurement Plan (Annex III), in accordance with the procurement methods established by the Bank, namely: (a) Hiring of individual consultants, as established in (a) AM-650 for the individual consultants; (b) GN-2765-1 and its associated operational guides OP-1155-4 for the firm consultants and (c) Contracting of logistics services and other services other than consultancy, according to the Policy GN-2303-20.

V. Major issues

5.1 The main risk is the consistency and continuity of the work with the previous phase of the study supported by TC RG-T2434. In order not to repeat and duplicate the products developed in the previous phase, the Bank will coordinate with main internal/external key technical resources involved in the previous TC. As such, the Bank may hire these resources as peer-reviewers.

5.2 Adequate data collection may be difficult to achieve. The data needed for the study include historical disaster information and long-term daily climate data registry (rainfall, temperature and wind speed). Even though the Bank has already identified some data accessible for the study, if such information is not sufficiently available, alternative proxy data to complement the existing data will be applied.

VI. Exceptions to Bank policy

6.1 None.

VII. Environmental and Social Strategy

7.1 No negative environmental impact is anticipated from this technical cooperation. Based on the Safeguard Policy Filter Report, the project does not require a classification or further environmental or social actions. According to the Environment and Safeguards Compliance Policy (OP-703), this TC is classified as category "C".

Required Annexes:

- Annex I – Result Matrix
- Annex II – Terms of Reference
- Annex III – Procurement Plan

[16] The Procurement Plan includes the procurement of consulting services based on the selection method of the single-source selection method pursuant to GN-2350-9, according to which this method may apply: (a) for tasks that represent a natural continuation of previous work carried out by the firm; (b) in emergency cases, such as in response to disasters and for consulting services required during the period of time immediately following the emergency; (c) for consultancy that shall not exceed US$100,000; or (d) when only one firm is qualified or has experience of exceptional worth for the assignment.

STUDY ON DISASTER RISK MANAGEMENT – A MACRO PERSPECTIVE COST-BENEFIT ANALYSIS FOR REDUCING VULNERABILITY

RG-T3369

SUS US$600,000
MDP US$200,000

CERTIFICATION

I hereby certify that this operation was approved for financing under the **Ordinary Capital Strategic Development Program for Sustainability (SUS),** and the **Multidonor Disaster Prevention Fund (MDP),** and through a communication dated February 27, 2019 and signed by Jane Silva (ORP/GCM). Also, I certify that resources from said funds are available for a combined up to **US$800,000** in order to finance the activities described and budgeted in this document. This certification reserves resource for the referenced project for a period of four (4) calendar months counted from the date of eligibility from the funding source. If the project is not approved by the IDB within that period, the reserve of resources will be cancelled, except in the case a new certification is granted. The commitment and disbursement of these resources shall be made only by the Bank in US dollars. The same currency shall be used to stipulate the remuneration and payments to consultants, except in the case of local consultants working in their own borrowing member country who shall have their remuneration defined and paid in the currency of such country. No resources of the Fund shall be made available to cover amounts greater than the amount certified herein above for the implementation of this operation. Amounts greater than the certified amount may arise from commitments on contracts denominated in a currency other than the Fund currency, resulting in currency exchange rate differences, representing a risk that will not be absorbed by the Fund.

Certified by: Original Signed — 3/19/19

Sonia M. Rivera
Chief
Grants and Co-Financing Management Unit
ORP/GCM

Date

Approved by : Original Signed — 3/21/19

Juan Pablo Bonilla
Manager
Climate Change and Sustainable Development
Sector CSD/CSD

Date