Disaster and Climate Risk-Sensitive Planning for Public Investment Decisions: Learning from two public-sector experiences of Lao PDR and Peru

Technical Note

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Introduction

Public investments in infrastructure, services and industrial production play a critical role in economic development and building of social equity. Although generally not accounting for more than 10- 15 percent of total investment in any one year, public investment plays a critical role. There are various structural and non-structural risks related to public investments. Environmental hazards is a serious problem and greater capacity to manage risks related to changing physical environment is needed in the future, as revealed by the recent earthquakes in Ecuador and Nepal.

Progress in making public investments more secure when faced with potentially damaging physical events and the levels of hazard require a series of steps and decisions. These include raising awareness across a number of different stakeholders, development planning formats and decisions, efficacious political decision making, the development of appropriate methodologies and instruments, as well as local, regional and national capacity building.

The case studies from Lao PDR and Peru lay out a conceptual basis for informing the challenge of risk reduction in public investments, as a basis for designing adequate and efficient policies, strategies, methods and instruments for disaster risk management (DRM). This includes considerations related to the social construction of risk and social discrimination in risk distribution; considerations of risk factors (hazard-multi-hazard contexts, exposure and vulnerability) and their interaction; the notions of resistance and resilience, capacities and capabilities; and with different aspects of DRM. The implications associated with climate change and its impact on the existing risk factors and conditions need to be closely considered.

Social and environmental dynamics introduce constant change in parameters that must be analyzed and understood at local levels. The complexity of dimensioning and consideration disaster risk includes the co-existence of other pervasive every day risks, conflicting goals of different social actors, as well as climate change uncertainty. The case studies demonstrate the need to for introducing holistic approaches to managing disaster and climate risk in public investment decision making.

Context: Disaster and Climate Resilience for Public Infrastructure Investments

Disasters pose a serious development challenge. Disasters have a pervasive impact on societies around the world: people's lives are lost, sometimes even whole communities are wiped out; livelihoods, assets, and savings are destroyed, economies are hit and survivors are left to face many challenges of the post-disaster recovery and reconstruction period. Poverty and vulnerability to disaster are closely linked: Living in hazardous areas, lacking access to basic services, and having limited assets and financial resources, the poor and vulnerable bear the brunt of disaster impacts. For example, in the Philippines, together with damage and economic losses, Typhoon Yolanda had significant impact on the incidence of poverty. As a result of the disaster, an additional 2.3 million people live below the poverty line, resulting in an increase in the poverty rate from 41.2 percent to 55.7 percent in the worst-affected areas**.**

Quality infrastructure is an imperative for sustainable and safe development, especially in the context of rapid urbanization. Much of the world is undergoing rapid urbanization, especially Asia and Africa. Linked to this there is a huge demand for infrastructure and services. Critical infrastructure deserves special attention in planning and development. Past disasters have shown that public buildings such as schools, hospitals, and critical government buildings have proved to be among the most vulnerable classes of structures. Yet in the aftermath of disasters, hospitals, as well as transportation, power, water systems, telecommunications network infrastructure, and buildings, housing emergency response services, are functionally critical. Previous disasters shows that that direct damage to critical infrastructure and associated interruptions in services can account for more than 50 percent of the overall financial losses from a major earthquake in an urban area.

Countries that ensure the quality of their infrastructure through both deliberate design and appropriate use and maintenance consistently demonstrate greater resilience to the shocks and stresses that disaster and climate risk pose. There are many measures and tools available to decision-makers to strengthen the resilience of critical infrastructure, and their disaster risk management (DRM) systems in general. These include for example: risk assessments and land use planning, infrastructure retrofitting programs, early warning and forecasting systems, financial protection schemes, but also better maintenance, emergency and recovery planning, and disaster risk-awareness and engaging communities in safety and resilience.

World Bank's Building Urban Resilience report1 highlights three key principles: (i) Risk-sensitive land-use planning; (ii) Infrastructure upgrading, and (iii) operational and emergency preparedness. **Locational mitigation** is the most effective, long-term strategy for addressing hazard risk. Risk assessments and risk-based land use planning manages exposure to existing disaster risks as well as reduces new risks created by rapid and haphazard development. **Structural mitigation** is a medium-term strategy for addressing hazard risk of existing infrastructure and making existing assets resilient to more frequent and high intensity shocks. Structural mitigation can encompass both engineered and green (or adaptive) solutions, such as improving impermeability of sidewalks, etc. Building codes should follow risk based assessment and be based on "performance-based design", which determines acceptable risk levels for different types of structures, on the basis of their desired performance (e.g., non-collapse/life safety) during and after natural hazards. Ensuring quality of construction is a natural extension of risk-appropriate design. Effectiveness of structural measures depend on quality, including proper maintenance such as fixing potholes in the road before the winter or the rains; painting steel bridges before they weaken through corrosion; inspecting and fixing cracks in concrete bridges, etc. **Operational mitigation** addresses the inevitability of disasters occurring and encourages

[1] World Bank. 2013. Ed by Jha, Miner, Stanton-Geddes. Building Urban Resilience: Principles, Tools and Practice.

contingency and recovery planning for the failure of systems. Emergency preparedness is particularly important for key economic sectors include water, energy and transportation.

Often, post-disaster situations offer an opportunity for "building-back-better" to higher safety standards. There are many examples of effective implementation of this principles. For example, following widespread floods after Tropical Cyclone Oswald in 2013, the national and the regional government in Queensland, Australia, pooled resources to create an $80million Betterment Fund. The fund allows local authorities to restore or replace essential public assets damaged by disaster to a more disaster-resilient standard than their pre-disaster standard.[2]

Over the past six years, the World Bank has been supporting Lao PDR through technical assistance in disaster risk management, and sectoral investments. In the transport sector, the World Bank has been assisting the government in including resilient principles into strategies and policies, and investments. Approximately half of the local roads (provincial, district, and rural road), have been classified as in poor condition, facing seasonal closures due to poor surface, deficient cross drainage, lack of water crossing structures, flooding, and slope slides. Low standards, lack of adequate maintenance, and technical designs that have not accounted for increased climate variability, make the local roads particularly vulnerable to disasters. There are many challenges, including limited domestic funding to preserve and upgrade the growing road assets. Approximately 30% of road maintenance budget is spent on emergency road repair.

Improving the quality of connectivity, optimizing the preservation of Lao PDR's existing road network, and building disaster resilience are important to guarantee the sustainability of the investment and transport services. Since 2012 with financing support from the Japan Policy and Human Resources Development (PHRD), the Ministry of Public Works and Transport (MPWT) received technical assistance as part of the Mainstreaming Disaster and Climate Risk Management into Investment Decisions project. Upstream work has been implemented by the Department of Roads under MPWT, under the overall supervision of the Ministry of Planning and Investment (MPI). A lending project (Road Sector Project II), currently under preparation, will take on board lessons learnt and scale-up the implementation of spot improvements for selected critical sections using the tools developed by the PHRD-financed project to supplement the road maintenance scheme. The new investment will also build on the results of the Road Sector Project I[3], scaling up the approach to climate resilient road asset management, assisting the sector to tackle the issues at upstream and downstream levels, incorporating climate change adaptation aspects into sector policy and strategy, development climate change action plan, and strengthening operating and implementation processes. The proposed project will also assist the sector to improve technical design and guidelines, and to put in place flooding mapping, landslides inventory, and provide technical training.

[2] GFDRR, World Bank, EU, UNDP. 2015. A Guide To Developing Disaster Recovery Frameworks. Sendai. March.
[3] http://www.worldbank.org/projects/P102398/road-sector-project?lang=en

The Case of Lao PDR : Mainstreaming Disaster and Climate Risk into Public Investment Decisions

Vientiane, Lao PDR [29 February, 2016; http://www.adpc.net/igo/contents/Media/media-news.asp?pid=1041&topic=#sthash.ehwYbZKx.dpbs

A systematic effort to integrate climate and disaster risk into national socio-economic development plans as well as key growth sectors by Lao PDR has put the country on the road to safety against natural hazards. The Ministry of Planning and Investment undertook the innovative initiative aiming at enhancing the human and institutional capacity for safer, value for money and risk-informed investment decisions.

"*Our rice production will definitely go up this year, as the irrigation scheme now has the capacity to water 45 hectares as opposed to 20 hectares previously*," explains Mr. Vilay Ouanpaseuth, Head of Phon Ngam village, proudly.

Talking about the enhanced capacity of the restructured dike in his district, he seems unaware that the Nam Khat irrigation scheme is only a case in point of the Lao government's bigger initiative to make public infrastructure resilient to natural hazard and resistant to climate change through risk-informed investments.

Miles away, Mr. Acheu Laochoup, Head of Choulaosenmai village, is excited about a road repair work that ties his village to the country's national road network, and helps border trade with China. Some critical sections of the road are usually washed out by flash flooding or affected by landslides. It often leaves the villagers in a lurch to have a smooth access to basic services such as transportation, health and education.

"*We hope that with the recent slope stabilization and culvert improvements, the specific road patches would no longer be affected by floods or landslides*," Mr. Laochoup says and adds that with a safer road, villagers can travel by buses to health facilities, and children go to school regularly.

The Nam Khat irrigation scheme and the landslide mitigation measures are the outcomes of the technical skills and risk information that the government officials acquired during 2013-2015. The program of the World Bank was implemented under a grant provided by the Japan Policy and Human Resources Development (PHRD) Fund's Technical Assistance Program to Support Disaster Reduction and Recovery. The Asian Disaster Preparedness Center provided technical services to the Ministry of Planning and Investment, Ministry of Public Works and Transport and the Ministry of Agriculture.

The recent disasters in Lao PDR were wake up calls for the need that exists for not only more appropriate building codes that takes into account potential disaster impacts, but also the need for developing and implementing land-use planning guidance that takes into account hazard and consequent risks. There exists an identified knowledge gap in Lao PDR with respect to the assessment and demarcation of potential risks from natural disaster, without which it is difficult to effectively implement DRM into planning and rural housing improvement.

A risk-informed national development plan

A landmark achievement of the project is the integration of policy guidelines on risk-sensitive investments into Lao PDR's 8th National Social Economic Development Plan that is effective from 2016 to 2020. The plan governs all kinds of investments in the physical as well as social infrastructure of the country, and government line agencies are bound to follow the related guidelines when investing in public infrastructure. The plan is the main vehicle for lessening the losses ensued from the impact of natural hazards.

Although the recently completed 7th National Social Economic Development Plan (2011–2015) also required line agencies to integrate disaster risk and climate change concerns into sectoral development plans, the agencies lacked technical skills and quantifiable information to put the plans into practice.

Under the project, ADPC supported the Ministry of Planning and Investment to operationalize disaster mainstreaming into public infrastructure investment decisions at policy, planning and implementation level in the country. The project has ensued in addressing the most pressing question as to how to do the practical mainstreaming by carrying out risk assessment for better investment decisions and developing mechanisms to make disaster mainstreaming possible. These instruments have been mainstreamed into the new national development plan through policy and strategic guidelines to address the issue of practical implementation of risk-inclusive investment plans.

Moving from 'what' to 'how' of mainstreaming

Accurate and quantifiable information about natural hazards is a key to making sustainable investment decisions. However, measureable data for developing risk-sensitive public infrastructure investment plans has not previously been available with the government. A general risk profile of the country, developed in 2010, provided a clear picture of the natural hazards and their overall impact on the country, but it wasn't quantifiable for precise investments.

Therefore, ADPC developed procedures and guidelines to conduct multi-hazard risk assessments in the irrigation, rural housing, and transportation sectors. This was followed by carrying out national and provincial level risk assessments, with a special focus on estimating the future impact of natural hazards and climate change on two of the most vulnerable districts of the country.

Lao PDR's transportation sector often suffers from landslides; thus, there was a need to have reliable information about the level of landslide threat to road infrastructure as well as to the commuters. ADPC developed a landslide inventory framework for critical national and provincial roads. The dataset provides in-depth information about hazard levels and potential disaster impacts on vulnerable routes. Consequently, the Ministry of Public Works and Transport is able to make informed investment decisions about revamping or constructing roads.

In order to enable government officials to use several categories of digital information, ADPC installed the Geo-Node Risk Atlas – a web-platform for the management and publication of geospatial data – at the National E-Government Center of the Ministry of Posts and Telecommunications, and provided hands-on training to the concerned staff. The online risk atlas is a useful resource for line agencies to access quantifiable disaster risk data about their respective sector for developing risk-sensitive infrastructure plans. It also hosts a landslide inventory map prepared by ADPC during risk assessment

of the road sector. Further, ADPC retooled the existing geographic information systems at three key ministries.

Based on the risk information and review of existing mechanisms, ADPC went on to develop a series of practical measures to incorporate disaster risk into existing national strategies, policies, planning and budgeting, as well as sectoral public investment plans.

Training workshops –building skills and creating public-private partnerships

The project provided an opportunity for Lao PDR's national- and provincial-level officials to hone their skills in reading complex data and utilizing available guidelines to incorporate risk reduction measures into public infrastructure design. Invigorating institutional capacity was yet another key element for a smoother process of mainstreaming disaster risk and climate change into infrastructure investment decisions in the country. ADPC arranged technical training workshops at several levels on safe construction practices, landslide management, investment planning, budgeting as well as on operational guidelines as how to include disaster risk management concerns in an infrastructure project cycle. Key ministries received hands-on training on using online risk portals, and ADPC imparted training on audit guidelines on transportation, irrigation, rural housing and urban land-use planning to the concerned departments.

Private sector plays a key role in developing infrastructure in various sectors. Most of the manpower and raw martial also comes from the private sector; thus, it was essential to inform them about the impact of natural hazards and climate change on country's development. For this purpose, over a hundred technicians and artisans learned about risk reduction practices and climate change adaptation with regard to resilient infrastructure.

Students are the drivers of change in any country. Investing in education for disaster and climate change means a major step towards a safer future. Keeping this in mind, ADPC also reviewed the existing curriculum of engineering courses being offered at the National University of Laos and developed modules on mainstreaming disaster and climate risk management into investment decisions for the university's engineering courses.

Demonstrating the acquired skills

In a bid to test the technical capacities of government officials who were involved in the project, ADPC provided expertise to reconstruct and upgrade two physical infrastructures in hazard-prone provinces by integrating disaster risk and climate change considerations into their construction design. Government officials and private sector artisans took part in repairing the National Highway at four points, and repairing and upgrading The Nam Khat irrigation scheme in Kasy district in Vientiane province.

"It was very helpful for me to get a chance to participate in the monitoring of a pilot road construction project. The acquired knowledge and experience gave me confidence to implement similar construction works in the future," says Mr. Latsamy Chittabounty, a road engineer from Bountai district.

Local people of both the provinces are happy to have a better and safer infrastructure. Similarly, the Government has tested the outcome of the project by incorporating disaster and climate change concerns in infrastructure building and retrofitting. Engineers and other staff, involved in the designing and construction of the pilot project, are better prepared to replicate similar or even better investment decisions in the future.

The Case of Peru : Disaster and Climate Risk Management into the National Public Investment System

***For more than a decade, the Peruvian Ministry of Economy and Finances (MEF) has systematically incorporated disaster and climate risk management into the National Public Investment System (SNIP). Planners for all public investment projects (PIP), at the national, regional and local levels, must consider the potential impact of disasters and, since 2011 of climate change, on project sustainability, identify appropriate risk reduction measures for each hazard, and undertake a cost-benefit analysis of the proposed measures as part of the pre-project design process. The MEF approach makes use of available territorial hazard and vulnerability analyses before downscaling to a context-based risk analysis that focuses holistically on all risks to project sustainability for a specific project, its locality, users and time period. Thereby, disaster and climate risk management are integrated into the project design process, via procedures that ensure not only the viability and sustainability of public investment projects but also that decisions concerning risk reduction alternatives are informed by technical and cost-benefit analysis. Additionally, the cost-benefit analysis demonstrates concrete DRM benefits, in the form of the savings that can be attributed to investment in risk reduction measures*.**

Background

Disasters and climate change are very relevant to public investment decision making in Peru, where most of the territory, and more than two-thirds of the populace, are exposed to multiple hazards that have the potential to cause loss and damage affecting the population, livelihoods, public services and socio-economic development. Public investment in highly vulnerable sectors such as sanitation, agriculture, health, energy, transport, housing and tourism represents some 70% of total public service projects. This reality, and the recognition that the economic impact of disasters is greater than the investment cost of risk reduction measures, inspired MEF to embark on a gradual process of incorporating disaster risk management into the public investment system.

This policy decision in 2004, by a single Ministry pre-dates Peru´s DRM law, which was enacted six years later in 2011. MEF´s DRM policy is applied nationwide to all public investments in service provision and infrastructure, which in the year 2013 amounted to over US$11 billion, as well as to new investments made under public/private partnerships. DRM practice is inserted in the existing National Public Investment System (SNIP) as an integral part of MEF´s strategy for sustainable public investment and economic development in Peru.

On behalf of the German Government, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has since 2004 provided MEF with technical support in developing of DRM norms, guidelines, instruments, instructions, guides and training materials that orient evidence-based practice and in training for their use in Peru. Beginning in 2011, that technical support began to focus on a holistic analysis of risk due to a diversity of potential effects of climate change, and the corresponding necessary adjustments to the DRM conceptual, normative and methodological frameworks. Putting MEF´s “Risk management in a climate change context” framework into practice is an ongoing effort which now focuses on building evidence for sectorial guidelines, drafting “how to” guides and training project planners and evaluators in Peru´s regions.

The mainstreaming process for DRM in Peru´s SNIP

The incorporation into Peru´s SNIP of disaster risk management in a climate change context began with the analysis of main entry points and change agents in the existing system. Based on the results of this analysis, the following process and products were developed for use in the SNIP.

1. Conceptual framework:
DRM mainstreaming is founded on a conceptual framework which ensures that actors share a common understanding of concepts and that definitions concord with national law and the SNIP. An extensive consultation process between actors from relevant ministries and experts on DRM and climate change led to an updated version of the original conceptual framework, informed by recent scientific evidence, which integrates the fields of disaster risk management and climate change adaptation in the SNIP (see DGIP-MEF, N° 6 in the Series SNIP and DRM).

2. DRM and climate change evidence
The challenge of DRM under the uncertainty of the climate change and development processes is met with improved access to dynamic information and holistic risk analysis. The practical application of the conceptual framework in PIPs was further advanced through an initial evidence-based assessment of the chain of effects generated by climate change in Peru and the potential impacts of those effects on different types of projects, as well as the identification of the types of risk climate change poses to projects and appropriate measures to reduce those risks. A holistic analysis of the risk to project sustainability due to disasters and climate change requires improved access to scientific knowledge and dynamic, local information about hazards, land use, climate, ecosystems, project location and climate change scenarios by project planners.

3. Case Studies
The process of moving from DRM theory and evidence toward the practice of risk management in a climate change context began by carrying out “pilot” project design with a team of PIP formulators in two regions vulnerable to climate change and disasters. These PIPs provide an holistic analysis of risk to project sustainability due to disasters and climate change (e.g. loss and damage, reduced supply of resources and inputs, heightened demand for certain public services and reduced benefit stream from a public service), the identification of measures relevant for the reduction of these risks, and a cost-benefit analysis of alternative measures to reduce risk in a disaster and climate change context specific to the project. The knowledge generated by these pilot PIPs provides field tested “know-how” used by the MEF for methodological design and in training, in cost-benefit analysis of risk reduction measures and as the basis for ministerial norms, guidelines, directives and instructions for use of instruments.

The practice of DRM in a climate change context in Peru

The pilot PIPs facilitate low-cost, field-based testing and methodological fine-tuning at the same time that they showcase the benefits of this approach to policy makers and operators of the SNIP. The advance from pilot PIP to improved DRM practice that incorporates holistic analysis of risk in the dynamic climate change context and in Peru´s mega diverse territory is based on updated SNIP norms and guidelines, and nationwide efforts to build institutional capacity.

1. **Official SNIP norms, guidelines and instructions**

The guidelines for project design were revised to ensure that heightened and broader risks due to climate change are considered at national and sector levels. The SNIP general directive which states that project planners are required to analyze the probable impacts of disasters and climate change on project sustainability and that PIP evaluators must verify compliance, was followed up by a new version of the "General Guidelines" for identification, formulation and evaluation of all PIP, updated to provide methodological guidance to all project planners in the incorporation of DRM in a climate change context. The knowledge generated by the case studies is used for mainstreaming climate risk considerations in guidelines for PIP planning in the tourism and other sectors.

2. Capacity Building

Building the capacity of project designers and evaluators to analyze holistically and manage the risks to their PIP associated with climate change is an on-going nationwide process. MEF is supported by a network of international donors interested in DRM in Peruvian public investment who coordinate capacity building efforts to ensure greater territorial coverage and the compatibility of concepts, materials and methods for understanding risk and analyzing cost-benefit of risk reduction measures. In 2014, MEF, GIZ and the University of International Cooperation (UCI-Costa Rica) implemented an intensive six-month e-learning course.

3. Monitoring DRM in a climate change context

The Peruvian case demonstrates the need to monitor the effective application of norms and guidelines for DRM in a climate change context and the implementation of risk reduction measures during a project lifecycle. MEF recently updated the PIP summary sheet, required to register PIP in the SNIP´s on-line Project Bank, to include information on risk analysis and management measures.

<u>Up scaling to a regional perspective</u>

The approach of mainstreaming DRM and climate change adaptation into existing planning processes is a very promising one. The SNIP process has had several impacts on disaster and climate risk management, reducing risk "on the ground" through improved project design, and changes in project components, activities and project locations. Potential future disaster and climate risks can be systematically reduced by building their corrective and prospective management into today's decision-making procedures.

1. Peer Learning

Regional and international peer learning workshops on public investments and adaptation to climate change are held periodically to facilitate dialogue and joint learning across the Latin American region. Experts from the finance, economy, planning and environment ministries of 11 countries participated in international workshops that have enriched the Peruvian process and motivated other countries to improve DRM and/or mainstream climate change considerations in their own SNIP.

2. Latin American Network on Risk Management and Climate Change in Public Investment

In mid-2014 eight Latin American countries formed a network of SNIP practitioners with the goal of building technical capacity for a systematic approach to DRM and CCA in public investment.