Project Study on "Methods of Disaster Risk Screening and Scoping for Development Projects"

Final Report

March 2015

JAPAN INTERNATIONAL COOPERATION AGENCY

SUNCOH CONSULTANTS Co., Ltd.
EARTH SYSTEM SCIENCE Co., Ltd.

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- Classification of Hazard
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<Abbreviations>

ADB	Asian Development Bank
AFD	Agence Française de Devéloppement
AusAID	Australian Agency for International Development
CRED	Center for Research on the Epidemiology of Disasters
DFID	U.K. Department for International Development
FEMA	Federal Emergency Management Agency
GIZ	Deutsche Gesellshaft für Internationale Zusammenarbeit
HFA	Hyogo Framework for Action
GDP	Gross Domestic Product
GRDP	Global Risk Data Platform
IDB	Inter-American Development Bank
IFRC	International Federation of Red Cross and Red Crescent Societies
MDGs	Millennium Development Goals
NASA	United States Aeronautics and Space Administration
NGDC	NOAA National Geophysical Data Center
NOAA	United States National Oceanic and Atmospheric Administration
OFDA	USAID Office of U.S. Foreign Disaster Assistance
ORSEC	Organisation de la Réponse de Sécurité Civile
SEDAC	NASA Socioeconomic Data and Application Center
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNISDR	The United Nations Office for Disaster Risk Reduction
USAID	United States Agency for International Development
USGS	United States Geological Survey

WFP	World Food Programme

1. Study Overview

1.1 Background of the Study

Disasters endanger human lives, deprive us of properties and assets accumulated in society, as well as the time and opportunities for development, and force the governments to allocate large budget to response/relief and recovery. Because developing countries have limited budgetary resources allocated for disaster risk reduction, they are vulnerable to disasters and experience difficulty in sustainable development. Because disasters affect society as a whole, disaster risk reduction should be pursued not only as separate projects but also as a cross-sectoral issue that is integral to development in general.

1.1.1 Global trends on mainstreaming of disaster risk reduction

Consequently, there has been an increasing momentum to promote "mainstreaming disaster risk reduction," emphasizing that (i) governments should position disaster risk reduction as a national priority, (ii) a perspective of disaster risk reduction should be adopted by every development sector, and (iii) proactive investment in disaster risk reduction should be increased.[1]

1.1.2 UN Action

The first step the United Nations took toward mainstreaming disaster risk reduction was the Hyogo Framework for Action 2005-2015 (HFA) - a detailed description and explanation of the disaster risk reduction work required of UN member states over the 10-year period starting in 2005 - adopted at the Second UN World Conference on Disaster Reduction in 2005. While the HFA does not explicitly define what it means to mainstream disaster risk reduction, the UN Office for Disaster Risk Reduction (UNISDR) - the organization that provides assistance for implementing the HFA - considers the first strategic goal of the framework ("integration of disaster risk reduction into sustainable development policies and planning") to be such a definition. This position of the UNISDR is further supported by the chair's summary at the World Ministerial Conference on Disaster Reduction in Tohoku held in July 2012, in which the chair stated, "The participants underscored the need to mainstream disaster reduction at every level of public policy by prioritizing it, ensuring adequate governance mechanisms for disaster reduction and allocating sufficient financial resources to it."[2].

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[1] Inoue, Tomoo (2013) "*History and Vision of the international framework on the mainstreaming DRR – International projects by MLIT-*" in "KASEN Vol. 69, No. 7"(Japan River Association, *in Japanese*) The paper says, "Mainstreaming DRR- has been often used recently, moreover, non-expert of DRR also has used it."

[2] http://www.mofa.go.jp/mofaj/gaiko/kankyo/bousai_hilv_2012/soukatu.html

1.2 Mainstreaming Disaster Risk Reduction at JICA

JICA and the Japan Institute of Country-ology and Engineering (JICE)[3] defined mainstreaming disaster risk reduction as "the comprehensive and continuous implementation and spreading of risk reduction measures that anticipate disasters of various scales across all sectors and phases of development, and the construction of disaster-resilient communities aimed at saving lives from disaster, sustainable development and reducing poverty" in 2013, and JICA has endorsed the promotion of mainstreaming disaster risk reduction within its ranks.

1.2.1 Importance of Investment in Disaster Risk Reduction

Thus, JICA emphasizes investing in disaster risk reduction in advance of disasters and believes approaches to disaster risk reduction require consideration of national and local economies in addition to human life. This is based on the idea that investing in advance can prevent the same people from suffering major damage from winds and floods that frequently strike the same areas and repeatedly threaten their lives and opportunities for economic growth, make escaping from poverty more difficult, draw out the negative effects of lengthy recovery and reconstruction and threaten the sustainable development of nations and communities.

1.2.2 Significance of Disaster Risk Reduction

JICA considers disaster risk reduction a crucial cross-sectoral issue for sustainable development as well as for human security, and believes considerations for disaster risk reduction should be included in the Development Agenda (Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs)) as a vital element of development. One concrete action JICA has taken in this regard is to plan this work to examine systems to build for implementing projects and studies that incorporate disaster risk reduction across all sectors, and for implementing ex-ante evaluations of disaster risk, studies and countermeasures when risks are present, and other work to incorporate forethought to disaster risk reduction into all sectors for development and consider disaster risk reduction before projects are implemented.

1.2.3 Forethought to disaster risk reduction Implemented by JICA

JICA has implemented various projects as technical cooperation for disaster risk reduction, including a project for disaster risk reduction education for school-aged children, a science and technical cooperation project that involved using up-to-date scientific and technical models and advanced observation techniques to improve legal and development plans as well as local disaster risk reduction plans, a project for flood countermeasures aimed at improving flood control and

[3]JICA & Japan institute of country-ology and engineering (2013) "Report of project study 'Mainstreaming DRR'"(in Japanese)

safety, a project for improving community disaster risk reduction capacity in cyclone shelters and schools, and "Build Back Better," a project for providing emergency assistance for recovery and reconstruction in the wake of disaster in which disaster risk reduction concerns were incorporated into recovery and reconstruction plans.

1.2.4 Significance of This Study

This work aims to incorporate disaster risk reduction concerns into all development projects undertaken by JICA from now on. Doing so as part of the construction of a hospital, for example, would not only enhance the hospital's functionality during natural disasters but also strive to incorporate non-technical measures such as disaster risk reduction education in the surrounding area and related sectors that could serve as water supply bases during disasters.

Therefore, in the report of this study we have focused on what disaster risk reduction concerns can be brought to fruition even by project managers who are not experts in disaster risk reduction by organizing scoping lists and collections of cases so that they can screen required items for each type of natural disaster and use them to select feasible counteractions, thus considering disaster risk reduction during the project.

1.2.5 Approach to Forethought to Disaster Risk Reduction

Decisions on the feasibility of the forethought to disaster risk reduction by JICA that are the purpose of this work are entrusted to the entities implementing the work, and the end goal of mainstreaming disaster risk reduction is to continuously consider disaster risk reduction; the fact is that no goal exists for forethought to disaster risk reduction. From now on, the goal is to continue to consider essential project objectives in addition to applicable conditions and to continuously apply these forethought to disaster risk reduction to all development projects in hopes of promoting the strategic goals of establishing and strengthening a disaster risk reduction system, promoting a full and common understanding of the risks posed by natural disasters, taking steps to reduce those risks in pursuit of sustainable development, preparing and responding rapidly and effectively, and seamless recovery and reconstruction to create more disaster-resilient communities.

1.3 Purpose of the Study

This study aims at concrete promotion of mainstreaming disaster risk reduction within JICA through the establishment of the methodology for examining the necessity of disaster forethought. It also intends to solidify the international position of Japan as a country that has knowledge and experience in the field of disaster risk reduction and is expected to lead the discussion in this field.

1.4 Study Period

From late August 2014 to March 2015.

1.5 Study Implementation Method

The flow of the implementation of the study is shown blow.

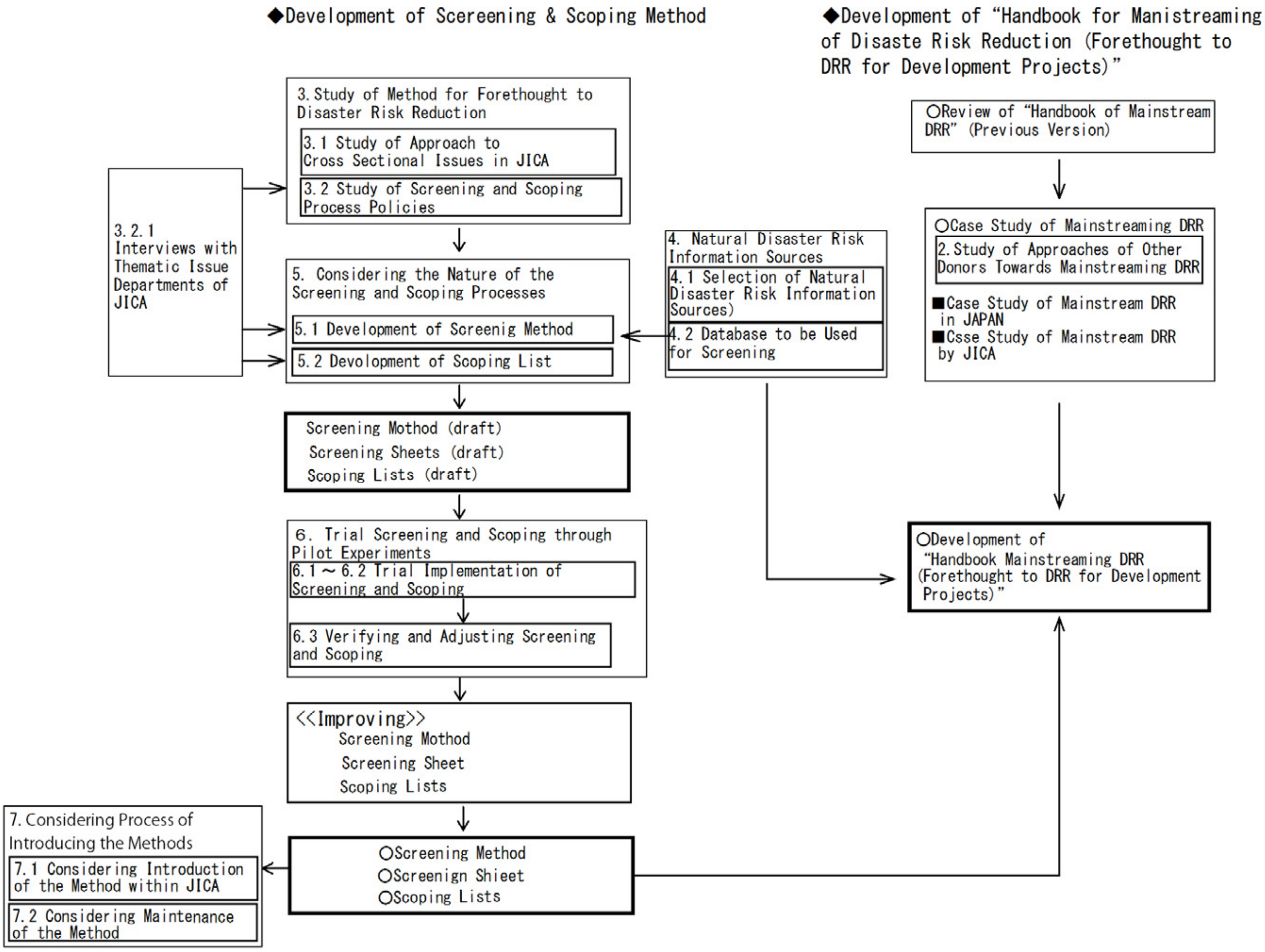

Figure 1.5-1 Flow of the implementation of the study

Note: The numbers of this figure denote chapters in this report.

1.6 Organizational Arrangement for Study Implementation

The study was conducted with the following organizational arrangement.

Assignment	Name	Company
Study team leader / Disaster risk reduction	Mr. Takao Aizawa	SC
Developing Screening Method	Dr. Ikuo Hgiwara	SC
Data collection about Mainstreaming of DRR	Dr. Takehiro Sugiyama	NTCI
Data collection about Natural Disaster Information	Ms. Kaoru Sasaoka Mr. Arata Sasaki	ESS
Developing Scoping Lists	Mr. Mitsuo Namikawa Ms. Eriko Ishizuka	SC
Arranging Test Run of Screening & Scoping	Mr. Kenjin Fukuyama	SC

(Note) SC : Suncoh Consultants ESS : Earth System Science NTCI:NTC International

2. Approaches of Other Donors Towards "Mainstreaming Disaster Risk Reduction"

Abnormal weather phenomena and other factors are recently causing increases in damage from natural disasters and the intensity of disasters per se all over the world. Although major donors are proposing "mainstreaming disaster risk reduction" there is no established methodology for assistance in disaster forethought.[4]This is related to the fact that advanced nations in Europe and the Americas do not have as much experience with disasters as Japan does, and the notion in the United States of America that disaster risk reduction is generally a personal responsibility. This section reviews the approaches of multilateral development banks and five major donor countries.

2.1 Multilateral Development Bank

At the present, the World Bank, the Inter-American Development Bank (IDB) and Asian Development Bank (ADB) are the only organizations taking actions towards "mainstreaming disaster risk reduction" among multilateral development banks.

2.1.1 World Bank

The World Bank Group released a Progress Report on Mainstreaming Disaster Risk Management in World Bank Group Operations (DC2004-0003)[5] on March 25, 2014. The report was prepared for the Development Committee meeting on April 12 of that year, and includes disaster risk reduction efforts undertaken by the World Bank Group to date and policies for the future. The World Bank defines "natural disasters" in largely the same way that Japan's Disaster Countermeasures Basic Act defines them - by omitting biological disasters from the definition as posted on the EM-DAT.[6]

Managing the risks of meteorological events and natural disasters is critical because the damage they cause is a major obstacle against eradicating poverty in developing countries by 2030. It was decided at the World Bank's annual meeting in 2013 that managing the risks of meteorological events and disasters would become a new central strategy for the bank, and a vice president in charge of meteorological events and disaster risk was installed in the World Bank Group on January 1, 2014.

[4]Ishiwatari, Mikio (2010)
"*Study on Development Assistance Method on Emerging Issues in Disaster Management and Reconstruction*"
Doctoral thesis, the University of Tokyo Graduate School of Frontier Sciences
[5] https://www.gfdrr.org/sites/gfdrr/files/publication/DC2014-0003%28E%29DRM.pdf
[6]The online global disaster database managed by the Centre for Research on the Epidemiology of Disasters (CRED), to be introduced in Chapter 4: Summary of Natural Disaster Risk Information.

IDA17 (the International Development Association) screens for the risks of meteorological events and disaster risks each time the World Bank Group enters a new partnership. The World Bank group plans to create a "resilience indicator" to express the progress of each country. This will solidify the global role of the World Bank Group concerning the risks of meteorological events and disasters.

Note: The World Bank's fiscal year is July 1 of the previous year to June 30 of the current year. (e.g. Fiscal year 2014 is July 1, 2013 to June 30, 2014)

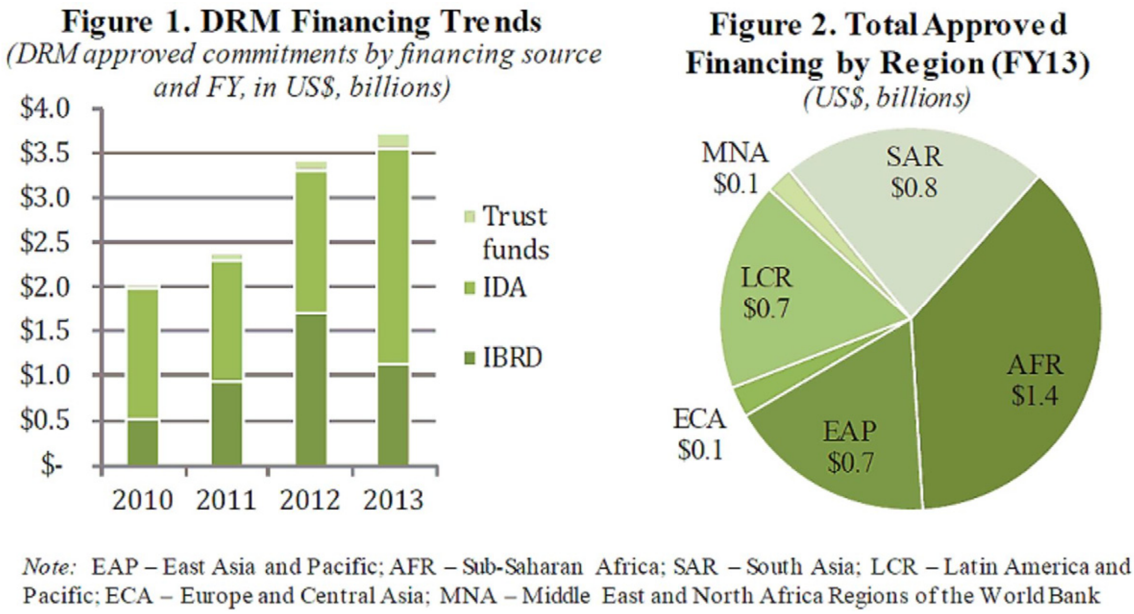

Figure 2.1-1 World Bank Spending on Countermeasures for Natural Disaster Risks

Source: World Bank and IMF (2014) "*Progress report on mainstreaming disaster risk management in World Bank group for natural disaster risk*"

The World Bank Group provided 2 billion dollars of funding for disaster risk management projects in fiscal year 2010, and increased financing to 3.8 billion dollars in fiscal year 2013(Figure 2.1-1). Furthermore, the World Bank has increased the proportion of assistance for pre-disaster risk management (disaster risk management) since 2010, a reflection of the outcomes of the World Bank meetings in Sendai. From fiscal years 2010 to 2013, the World Bank provided assistance for 41 cases of damage assessment and 26 cases of reconstruction.

Through the Global Facility for Disaster Reduction and Recovery (GFDRR), the World Bank Group provided over 60 countries with access to financial assistance in times of disaster. The group has also enhanced support disaster risk management for local communities; it launched a pilot program for disaster insurance for Caribbean and Pacific Island countries in 2013 and is planning to expand the reach of the program into Central American and Indian Ocean island nations. In addition, systems such as the Southeastern Europe Catastrophe Risk Insurance Facility and efforts to promote and spread agricultural insurance systems under way in Bangladesh, Haiti and Kenya to other countries are under consideration.

On February 3, 2014, the World Bank designated 100 million dollars provided by the Japanese government to promote the mainstreaming of disaster risk reduction more proactively. Specifically, the World Bank and the Japanese government joined forces to launch the Japan-World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries, a new program for supporting disaster risk reduction efforts in developing countries. This program aims to use Japan's expert knowledge about disaster risk reduction and provide assistance for various efforts to reduce vulnerability to natural disasters so that the World Bank can mainstream disaster risk reduction through its development planning and investment programs. Part of the program involved the establishment of a network connecting disaster risk reduction research hubs in Japan and areas the World Bank serves, as well as a Tokyo Disaster Risk Management Hub for supporting disaster risk reduction projects in developing countries, the result of combined efforts of the public and private sectors in Japan.

The World Bank Community for Practical Disaster Risk Management[7] comprises seven teams of experts in (a) disaster risk loan insurance institutions, (b) risk information (research institutions), (c) hydrological services, (d) adaptation to climate change, (e) social development and disaster risk reduction, (f) resilient reconstruction, and (g) safe schools. As of 2013, this community has a staff of 112 people, which is 20% greater than the number of staff in fiscal year 2011. Figure 2.1-2 is an organizational chart for the Community for Practical Disaster Risk Management.

[7]World Bank (2014) "*Progress report on mainstreaming disaster risk management in world bank group operations*"

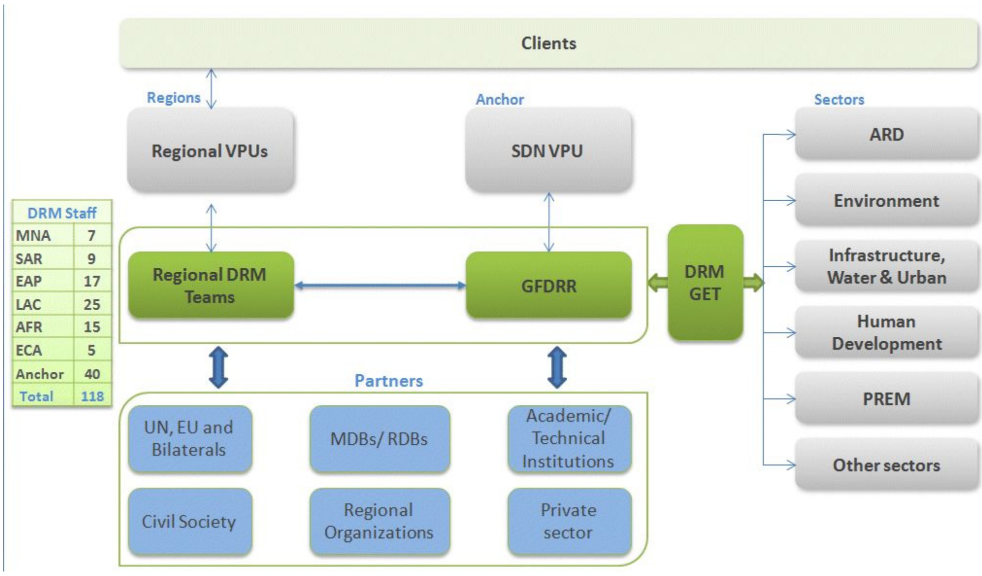

Figure 2.1-2 Organizational Chart for the Community for Practical Disaster Risk Management

Note: The number of staff members differs from the number in the text of this report. This is likely because the fiscal year is different.

Source: https://www.gfdrr.org/sites/gfdrr.org/files/1_DRM_at_the_Bank.pdf

The World Bank Group will implement the following measures in the disaster risk management field in 2015:

(a) Cooperate toward forming a development agenda for 2015

(b) Work together with other partners to intensify and synchronize outcome measurement

(c) Enhance learning based on objective and scientific evidence

(d) Incorporate disaster- and climate-related risks into development plans to provide assistance for client countries.

(e) Continue to cooperate with the private sector to provide innovative financial protection systems.

(f) Expand expert knowledge, which is the core of new WBG global practices.

The three global processes planned for 2015 - a new framework agreement for climate change, post-MDGs[8] and devising post-HFA[9] - are expected to increase the importance of disaster risk reduction focused on present and future development goals. Thus, the World Bank Group is planning to incorporate disaster risk reduction into the post-IDA17 framework and actual operations.

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[8] Millennium Development Goals. It was adopted in the UN millennium summit held in New Yok on 2000.

[9] Hyogo Framework for Action 2005-2015. It was adopted in the 2^{nd} UN world conference for DRR held in Kobe, Hyogo Prefecture on 2005. It showed actions that member countries should do for over 10years form 2005.

2.1.2 Asian Development Bank (ADB)

(1) Background

The Asia-Pacific region in which ADB operates accounted for 25% of the world's GDP (from 1989 to 2009) but 38% of the world's economic loss from natural disasters. The region's population exposed to the threat of natural disasters is four times that of Africa and over 25 times those of Europe and North America, and annual economic loss is estimated to be 19 billion dollars.

From 1987 to 2013, ADB provided 19.5 billion dollars of funding (including loan aid, grant aid and technical assistance) for a total of 631 projects related to disaster risk management. The amount is 10.3% of the total funding for loan aids, grant aid and technical assistance. Around one-third (6.4 billion dollars) of the assistance from projects related to disaster risk management was provided after disasters struck (Figure 2.1-3). Since the introduction of ADB's Disaster and Emergency Assistance Policy (DEAP) in 2004, major natural disasters have frequently struck the Asia-Pacific region. The bank provided 3.6 billion dollars of aid for five disasters alone - the 2004 Indian Ocean Earthquake and Tsunami, the 2005 Kashmir Earthquake, the 2008 Sichuan Earthquake in China, floods in Pakistan in 2010 and Typhoon Yolanda in the Philippines in 2013.[10]

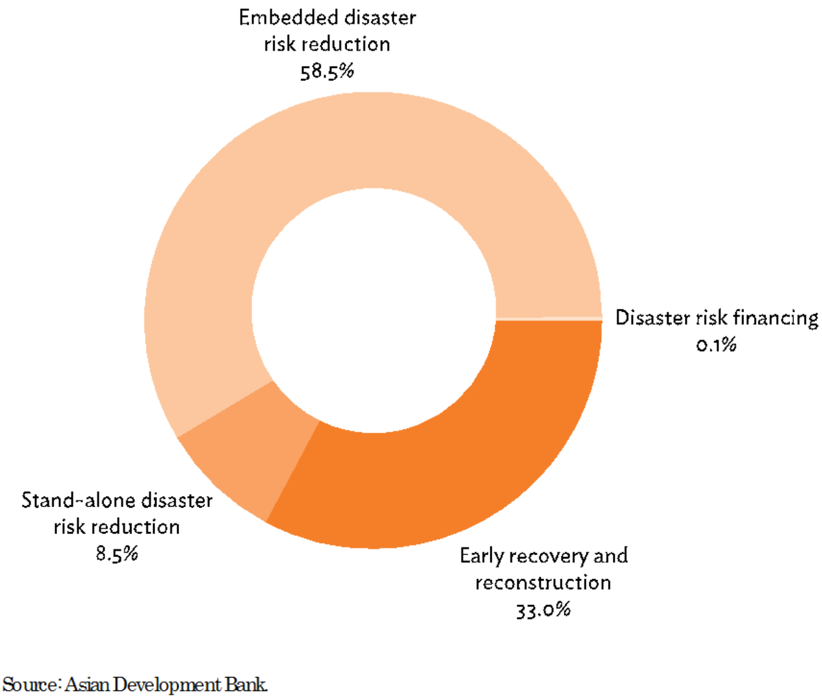

Figure 2.1-3 ADB disaster risk management assistance, 1987-2013

Source: ADB(2014) "*Operational Plan for Integrated Disaster Risk Management 2014-2020*"

[10] Asian Development Bank (2014) "*Operational Plan for Integrated Disaster Risk Management 2014-2020*" Asian Development Bank, Manilla.

(2) Changes in ADB Disaster Response Policy

ADB disaster response policy has undergone the following changes.

・1987: Rehabilitation Assistance for Small Developing Member Countries Affected by Natural Disasters

This is the first introduction of ADB disaster response policy, and marked the first time a development bank other than the World Bank introduced such a policy. In addition, this policy was mainly targeted at disaster recovery.

・1989: Post-Disaster Rehabilitation Assistance

Some disaster reduction elements were incorporated for the first time.

・2004: Disaster and Emergency Assistance Policy (DEAP)

Disaster reduction efforts in preparation for disasters were incorporated. The policy encouraged investment in disaster risk reduction and mitigation.

・2008: Action Plan for Implementing ADB's Disaster and Emergency Assistance Policy

This plan proposes actions to take to implement ADB's DEAP over a three- to five-year period and proposes the mainstreaming of disaster risk reduction into ADB's plans and daily operations. The DEAP and action plan propose how to enhance structural and non-structural measures against disasters, as well as how to implement them in balance with each other.

・2008: Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank 2008-2020

This strategy continues the mainstreaming of disaster risk management and proposes working with aid agencies with expertise to respond to and offer assistance in the initial and interim stages after disasters strike.

・2014: Operational Plan for Integrated Disaster Risk Management 2014-2020 (IDRM 2014-2020)

Regarded as a successor to the DEAP action plan from 2008, this operational plan is consistent with DEAP 2004 and was prepared based on ADB's significant support for disaster risk reduction and good performance in many cases of managing disaster risk. It aims to promote approaches to disaster risk management within ADB operations. Efforts for integrated disaster risk management (IDRM) are based on the three core principles of disaster risk management and aim to invest and involve stakeholders in the organization of IDRM and the improvement of capacity, knowledge and resilience against disasters (Table 2.1-1). Cross-sectoral action is taken to fulfill those three main requirements of disaster risk management (Figure 2.1-4).

Table 2.1-1 Implementation of Approach to Integrated Disaster Risk Management through Cross-sectoral Action

	Outcome: Strengthened resilience	
	Reduced disaster risk in the immediate and long term	Enhanced residual risk management for effective disaster response
Institutionalizing IDRM		
CPS disaster and climate risk sensitization	x	x
Disaster and climate risk project screening tool	x	
Capacity development and knowledge solutions		
DMC IDRM mainstreaming capabilities	x	x
IDRM-related public goods and services	x	x
Informal ADB IDRM network	x	x
IDRM CoP representation	x	x
Training and workshops	x	x
Knowledge products	x	x
Investments in disaster resilience		
Disaster risk reduction	x	
Post-disaster assistance	x	x
DRF instruments	x	x
Stakeholder engagement		
Partnerships	x	x
Private sector engagement in IDRM	x	x
Financial resource leverage	x	x

ADB = Asian Development Bank, CoP = community of practice, CPS = country partnership strategy, DMC = developing member country, DRF = disaster risk financing, IDRM = integrated disaster risk management.
Source: Asian Development Bank.

Source: ADB (2014) "*Operational Plan for Integrated Disaster Risk Management 2014-2020*"

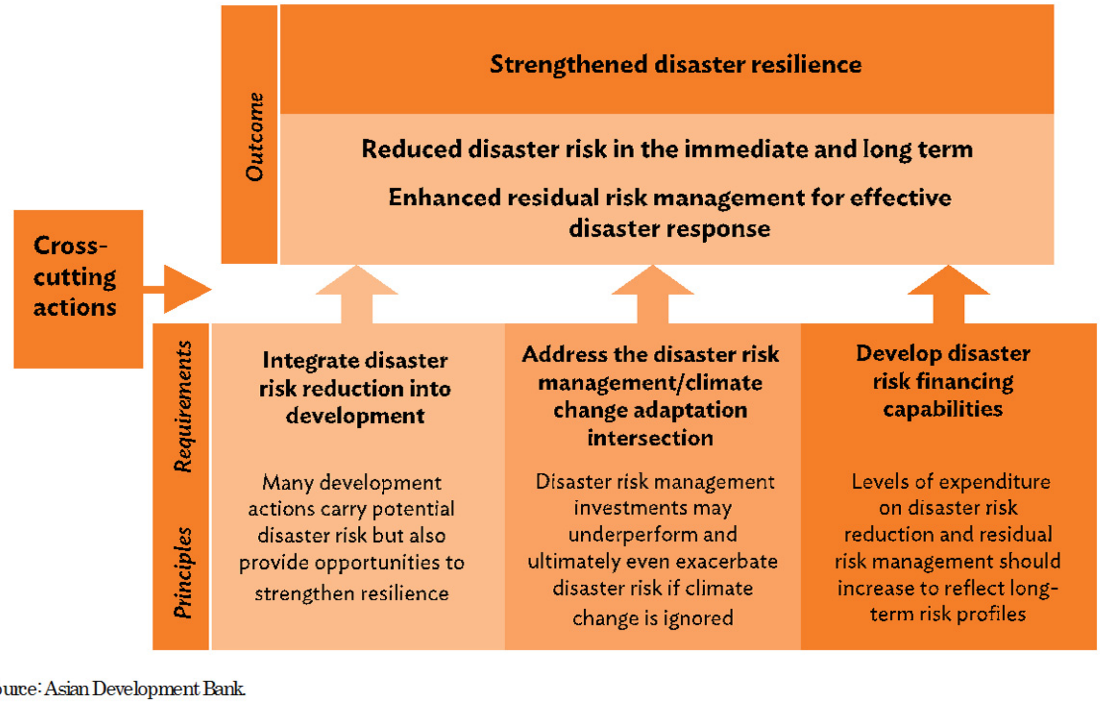

Figure 2.1-4 The integrated disaster risk management approach in ADB

Source: ADB (2014) "*Operational Plan for Integrated Disaster Risk Management 2014-2020*"

(3) Promotion of Mainstreaming Disaster Risk Reduction Within ADB

The DEAP action plan of 2008 was created to mainstream disaster risk reduction into ADB's daily operations. While the plan touched upon employee training, the establishment of an informal network for exchanging disaster risk information within ADB and the organization of hazard information for each country based on information obtained from previous assistance, only a part of the training and creation of guidelines for employees was implemented.

The IDRM 2014-2020, which is the successor to the DEAP action plan of 2008, calls for the proactive incorporation of IDRM into core operational processes, and for the development of tools and creation of written guidance toward that end. The following is an overview of the tool and written guidance development.

1. Creation of written guidance

Guidelines are created to set out how to incorporate problems associated with the risks of disaster and climate change into operations categorized by sector and topic when preparing assistance strategies for each country. These guidelines are intended to improve and more consistently apply existing screening tools for projects aiming to fully manage the risks of disaster and climate change. The guidelines also touch on the possibility of encouraging ADB's developing member countries (DMC) to incorporate the organization of IDRM into their operational processes.

Each ADB local regional departments use written guidelines on evaluations by sector and topic when creating assistance strategies for each country partnership strategies for the Pacific region, and that guidance incorporates guidance on how to consider and deal with disaster risks for each country.

Guidance for securing and using disaster risk data based on public and easily accessible online resources are created and periodically updated.

Part of the process of creating assistance country partnerships strategies for each country is to systematically consider disaster risk. While this consideration may affect the decision of areas of emphasis, an important point is that it aims to prevent the complete loss of ADB investments to disasters, regardless of whether or not IDRM has been selected as the area of emphasis for promoting disaster risk awareness.

2. Development of tools for screening projects on the risk of disasters and climate change

Tools for screening projects on the risk of disasters and climate change will be developed for use in project design.

The tools will be developed to simplify or otherwise improve upon existing screening tools for disasters and climate change. The screening is carried out in two stages: if the first stage of screening reveals significant risks due to disasters or climate change, a second stage of screening is carried out.

Screening protects individual ADB investments in addition to preventing the investments from bringing about new disasters or exacerbating existing disaster risks. Screening also actively incorporates systematic approaches into disaster and climate change risk analysis at the project level, and aims to place a greater responsibility on ADB to explain its actions to DMCs.

3. Establishment of an informal network of ADB employees for IDRM

This network is established to use, introduce and organize knowledge and experience with IDRM.

Employees involved in disaster-related projects are called on to participate. Network members are also expected to continuously make their best efforts toward IDRM. The network was launched because outcomes were not being produced despite the central roles and many years of effort put in by regional departments and resident missions for high disaster risk DMCs with high disaster risks. It is expected that there will be a need for the network to become an official organization in the future.

4. Assignment of responsibilities

IDRM is a cross-sectoral issue for all practical business committees within ADB. Each practical business community requires a person in charge of IDRM, but assigning one to each community is not realistic. Therefore, a group of people responsible for multiple sectors must be created.

5. Continuous IDRM training for employees

Training for leading workshops on IDRM and training on techniques for assessing needs after disasters strike are implemented regularly, and training for other sectors and topics also incorporate IDRM.

6. Development of educational materials

These educational materials incorporate knowledge and experience obtained from non-ADB action by citizens and communities inside and outside the Asia-Pacific region, and are shared within ADB as well as with other governments and stakeholders.

2.1.3 Inter-American Development Bank (IDB)

Since there are a lot of countries in the Central and South American area prone to earthquakes, these countries have a much higher mortality caused by disasters than other developing countries in other regions.[11] Therefore, IDB has been working with a focus on disaster management measures in disaster stricken Central and South American areas. IDB has introduced the PDCA cycle titled "Disaster Risk Management Business Model"[12], and prepared a "disaster risk profile" for each country.

With 5 indices developed by IDB, which are Disaster Deficit Index, Local Disaster Index, Prevalent Vulnerability Index, Risk Management Index and Index of Governance and Public Policy, IDB has quantified the progress of disaster management in Central and South American countries.

In addition, it has conducted a study on disaster management systems of various countries including Japan in its program called "RG-T2434: Development Profile Public Investment in Disaster Risk Reduction."[13]

[11] According to the lecture and presentation material by Tsuneki Hori, IDB Specialist at the disaster management seminar held at the World Bank Tokyo Disaster Risk Management Hub on December 11, 2014. Mortality by disaster are ADB members 0.018%, AfDB members 0.006% and IDB members 0.042%, respectively. Those of IDB's are prominently higher than others.

[12] Downloadable at http://publications.iadb.org/discover

[13] According to the lecture and presentation material by Tsuneki Hori, IDB Specialist at the disaster management seminar held at the World Bank Tokyo Disaster Risk Management Hub on December 11, 2014.

2.2 Major Donor Countries

Before discussing the support provided by donor countries, this section reviews the domestic disaster management systems of leading donor countries (see Table 2.2-1 for details).

Because of historical backgrounds such as the origins of different countries, there are only a limited number of countries where the central governments are playing central roles in disaster management, as is the case in Japan. Among major donor countries, France, Germany and the Netherlands have systems for the involvement of the central governments in disaster management. France has developed ORSEC and other programs, and has adopted disaster management policies similar to those in Japan.

On the other hand, the UK and the US lack an emphasis on the concept of disaster management to begin with. Particularly in the US, the principle of self-responsibility and after-the-fact response has long been maintained, and as a result, Hurricane Katrina in 2005 caused tremendous damage leaving 1833 people dead[14]. Hurricane Katrina was similar in scale to Isewan Typhoon (also known as “Typhoon Vera”) that hit Japan in 1959, and a typhoon of this size would not inflict similar damage on Japan. As Hurricane Katrina in itself was not a devastating disaster like the Great Hanshin-Awaji Earthquake or the Great East Japan Earthquake, the huge damage may be considered as a result of the American principle of “self-responsibility and after-the-fact response in disaster management”[15].

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[14] Knabb, R. D. , Rhome, J. R. and Brown, D. P. (2005, 2006, 2011):”*Tropical Cyclone Report Hurricane Katrina 23 - 30 August 2005*” NOAA U.S.A.

[15] In the case of the United States, the peculiar historical background to the formation of the country involving the “confrontation between the federal government and state governments” has been a factor complicating disaster responses.

Table2.2-1 Comparison of Typhoon Vera and Hurricane Katrina

Disaster	Typhoon Vera (or Ise-Wan Typhoon)	Hurricane Katrina
Central pressure at time of land fall	929hPa at 34°N	920hPa at 29.3°N
Wind speed	45m/s at the cape of Irago	55m/s in 113km southeast of New Orleans (Converted to average of 10min.)
Storm surge	3.55m in Port of Nagoya	8.63m near Biloxi 3.65m on the south coast of Lake Pontchartrain
Wave height	8 - 10m out of bay 2.4m in Port of Nagoya	16.8m near Gulfport 3.04m on the south coast of Lake Pontchartrain
Number of Deaths and Missing	5,009	1,330(Estimated deaths) 2,096(Missing)
Estimated damage	505 billion yen (Aichi and Mie prefectures)	96 billion dollars (1,058.09 billion yen)

Source: Cabinet Office, Government of Japan (2008) "*The report of 1959 Ise-wan Typhoon*"
Note: Exchange rate is referred to the statistics of UNCTAD (2005: 1USD=110.218Yen).
http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx

Table 2.2-2 shows disaster response systems for each country as of 2003. Note that the United States of America's disaster risk reduction systems changed significantly in favor of making federal assistance more flexible after the system for declaring a state of emergency used by the Federal Emergency Management Agency (FEMA) and conflict between that American government offices exacerbated the damage caused by Hurricane Katrina in 2005. Note also the lack of change in the focus on post-disaster response. For details on the changes in the USA, please refer to "Foreign Legislation" No. 251 at the National Diet Library (2012).

In the U.S.A, the national government and individual state governments are sometimes opposed each other, it was resulted from context at the foundation of the country. This is unusual case in the world, and it sometimes make difficult to national disaster management.

Table 2.2-2 Disaster Responses in Major Developed Countries (2003)

Nation	Major Natural Disaster	Disaster Responce
UK	1985:Huge fire 1988:Huge fire 2000: Flood 2003: Flood	・There is not much history of major disasters, and disaster risk reduction systems are focused on rural regions. There is no government agency specifically in charge of emergency response to disasters. ・The main duties of civil defense shifted to response to natural disasters and the like with the collapse of the Cold War paradigm. ・Emergency response to disasters is mainly handled by municipal police departments, fire departments and emergency care organizations. Municipal governments request assistance from other municipalities and from the military. ・The roles of the police department expand across a broad range when disasters strike. When major disasters strike, the police communicate information to and generally coordinate relevant authorities. ・The authorities dispatch liaisons to local police headquarters, and municipalities assist in this dispatch. Volunteers are involved in evacuation.
USA	1998: Hurricane Mitch 1999: Hurricane Floyd, Heat wave 2001[1)]:Earthquake in Seattle	・Based on lessons from disasters, the capacity of FEMA (established in 1979 to manage emergency situations) has been strengthened since 1993. ・When disasters strike, responses are carried out in accordance with the Disaster Relief Act. State governments lead the response to small-scale disasters. Once a disaster has been deemed major, the president declares a state of emergency, and the federal government leads the response. ・Assistance for disaster victims is flexible, coming in different forms such as cash and coupons. ・FEMA became a part of the Emergency Preparedness and Response Directorate of the Department of Homeland Security after the department was established.
Germany	1993: Flood 1997: Flood 1999: Flood 2002: Flood	・Each constituent state is responsible for responding to disaster situations and has established legislation on protection from disaster situations and the like. The Federal Office of Civil Protection and Disaster Assistance responds when the response required exceeds the capacity of the states. ・The federal government carries out emergency response and the like in accordance with the Restructured Civil Protection and Disaster Assistance Act. ・Fire departments are the main entities leading disaster risk reduction in each state. ・The Federal Agency for Technical Relief (THW) is the Federal Office of Civil Protection and Disaster Assistance's operational force for disaster relief, but volunteer members are the driving force behind THW. ・THW is one of the few federal agencies capable of deploying throughout Germany, where states have

		strong authority.
France	1998: Avalanche 1999: Storm 2000: Flood	・Responses to national disasters and the like are carried out within the framework of civil defense. ・Responses to disasters are generally carried out by cities and other local authorities. ・The core plan for response to natural disasters is the ORSEC (a rescue organization) Plan, which was established in 1952. ・The Directorate of Defence and Civil Security (DDCS) was established under the Ministry of the Interior to function as the central government organization that prepares for major disasters. ・The DDCS includes the permanent installation of various units (disaster investigation and reconnaissance units, disaster relief units, etc.) essentially capable of deploying within three hours of the occurrence of an emergency situation and staying on duty for up to 15 days.
The Netherlands	1993: Flood 1995: Flood 1998:Flood	・The spirit of cooperation and discipline developed among Dutch people through long battles against flood damage plays a critical role in the nation's crisis management. ・The disaster response system used is known as a "sequential procedure" (the entity leading the response progresses in order from small to large (city to province to nation)). ・The National Coordination Center in the Ministry of the Interior is responsible for crisis management on the national level. ・Fire departments are the main organization for disaster response.
Switzerland	1994: Flood 1997: Flood, Avalanche 1999: Storm 2000: Landslide 2002: Torrential rainfall, Flood	・The civil defense organization leads the disaster risk reduction system. Since the collapse of the Cold War paradigm, the focus of disaster risk reduction has shifted to natural disasters, for example when disaster risk reduction objectives were added to civil defense in 1995. ・Primary response to disasters is the duty of each canton, but when a region is unable to respond fully to a disaster, the federal government dispatches specialist units and military forces in response to requests from the field. That said, there are no past examples of the federal government dispatching military forces directly. ・The Civil Defense Law (established in 1959, revised significantly in 1994) and the Evacuation Center Construction Law (established in 1963, partially revised in 1994) comprise the legislative foundation for civil defense in Switzerland.Civil defense employees total around 380,000, or 5.5% of the population of Switzerland.
Canada	1996: Flood 1997:Flood	・The central government agency that manages crises in times of emergency is the Critical Infrastructure Defense and Emergency Response Agency under the

	1998: Ice storm	Ministry of National Defense. ・In general, provinces handle disaster response, and the federal government provides assistance to the provinces as necessary. ・The Emergency Law and Emergency Response Law established in 1988 are laws related to disasters.
Australia	2000: Storm 2001: Flood, Forest fire 2002: Drought, Forest fire	・The federal government's crisis management system is based on federal emergency management policy introduced in 1995. ・Each state is regarded as having authority over the protection of Australian life and property during disasters. ・Federal crisis management is carried out by entities such as the National Disaster Recovery Task Force, Emergency Management Australia and the National Emergency Management Committee.

Source: Iwaki, Shigeyuki (2003) "*Natural Disasters and Emergency Response*" in "*Report on the Comprehensive Study of Handling of Emergency Situations in Major Countries*" (National Diet Library (2003), with trends in the USA through 2012 added from "*Foreign Legislation*" No. 251 (National Diet Library, 2012))

Note 1) In original, it was written as "2000", but obviously it was mistaken.

France has established the ORSEC Plan (a plan for a response system for protecting civil security) and other initiatives, and is similar to Japan in that its central government spearheads disaster countermeasures. However, there are differences between individual disaster risk reduction policies in each European country. The paper written by ten Brinke *et al.*[16]from Dutch flood risk management research institution Bureau Blueland[17] explains flood risk management in Japan, Germany, the Netherlands, Belgium, the UK, France and the USA. The paper compares disaster risk reduction systems dealing with flooding in each country based on the Safety Chain Approach advocated by FEMA of the USA.

According to the paper, Japan and the Netherlands place an extremely strong emphasis on prevention in their flood risk management. On the other hand, Germany places an extremely strong emphasis on proaction and post-disaster response (Table 2.2-3).

[16] ten Brinke, W.B.M., et al. (2008) "*Safety chain approach in flood risk management*", Proceedings of the ICE Municipal Engineer, 161(2) P.93-102

[17] Organized at Utrecht University, in the Netherlands.

Table2.2-3 Difference in flood risk management among seven countries

	Pro-action	Prevention	Preparation	Response	Recovery
Japan	Strong emphasis	*Very strong emphasis*	Strong emphasis	Strong emphasis	*Little emphasis*
Germany	*Very strong emphasis*	Strong emphasis	Strong emphasis	*Very strong emphasis*	*Little emphasis*
The Netherlands	Strong emphasis	*Very strong emphasis*	Strong emphasis	Strong emphasis	Average emphasis
Belgium	Strong emphasis	Strong emphasis	Strong emphasis	Strong emphasis	Average emphasis
UK	Strong emphasis	Average emphasis	*Very strong emphasis*	*Very strong emphasis*	Strong emphasis
France	Average to strong emphasis	Average emphasis	*Very strong emphasis*	*Very strong emphasis*	Strong emphasis
U.S.	*Little emphasis*	*Little emphasis*	*Very strong emphasis*	*Very strong emphasis*	Strong emphasis

Note: This table shows that Japan places little emphasis on recovery from floods, but we believe the authors' study may have overlooked the fact that all disaster recovery (not only from floods) is implemented according to the Basic Act on Disaster Control Measures (a general law) and other laws (the River Act, etc.).

Source: see footnote 15

While the UK and France emphasize preparation and post-disaster response, their emphasis on prevention is at an average level. It is worth noting significant differences in disaster risk reduction between European countries. In the UK, administering disaster risk reduction is left to regional governments, while in France the central government is involved in disaster risk reduction.

The paper observes that the difference between flood countermeasures in France and the Netherlands could be due to the difference in natural conditions of each country's rivers.

The paper goes on to point out flood prevention measures in the USA are the most different from those in the Netherlands; while hardly any attention is paid to proaction or prevention, most emphasis is placed on post-disaster response.

The authors conjecture that this is rooted in the fatalistic view in the United States that natural disasters are a fact of life[18] and cannot be avoided.[19]

They close by saying that, while Japan and the Netherlands have different natural conditions (location of flood zones, urban areas, etc.), their systems for responding to floods are virtually identical, as "the government plays a central role within all the safety chain links" in Japan.

The domestic systems for disaster management in major donor countries also greatly affect their international assistance. Because HFA was established shortly after the tsunami in the Indian

[18]"Fact of Life" is defined as "Something that must be accepted and cannot be changed, however unpalatable:" in Oxford English Dictionary.

[19]People believed the earthquake that struck Lisbon, Portugal in 1755 was divine punishment. Sebastião José de Carvalho e Melo (1699-1782), the Marquis of Pombal, rejected that way of thinking, instead enacting strong policies meant to intensify building standards in Lisbon and implementing what at the time were advanced disaster risk reduction measures. (Source: "Untold History: The Day the World Changed: The Impact of the 1755 Lisbon Earthquake" NHK, aired January 14, 2015.)

Ocean, countries tend to put more emphasis on "early warning" among the five objectives of the actions.[20]

As for structural measures for disaster risk reduction, the World Bank and the IDB are studying cases in Japan as a reference, as mentioned in the discussion of multi-donor assistance. This is likely because they are affected by disaster response systems in each country, particularly the idiosyncratic system in the USA.

The following section describes cases of mainstreaming disaster risk reduction in six major donor countries (France, Germany, the Netherlands, Australia, the UK and the USA) based on documents publicized by their government agencies.

【References】

National Diet Library (2003), "Emergency Responses in Major Countries: Comprehensive Survey Report"

National Diet Library (2012), "Legislation in Other Countries" No. 251

[20]Summary proceedings of the first study meeting on the JICA project study "Mainstreaming Disaster Risk Reduction" held on November 21, 2012

2.2.1 Deutsche Gesellschaft für Internationale Zusammenarbeit GIZ (German Federal Enterprise for International Cooperation)

GIZ is promoting disaster management from the standpoints of national security and peacemaking. The three pillars of disaster management in GIZ are “risk analysis,” “disaster prevention,” and “disaster preparedness. ”These are intended to prevent the loss of human lives and economy in developing countries through disaster management.

In a separate document entitled “Emergency Response and Recovery: Disaster Risk Management,” the section entitled “Our Experience” gives a comprehensive explanation of disaster evacuation drills in Mozambique as well as the Philippines, and the establishment of disaster response systems in Asia, Africa and Latin America. The document introduces the following examples of disaster risk reduction efforts in Central Asia as a focal region, and it should be noted that this includes cases of disaster reconstruction.

- Reconstruction of a bridge washed away by floods in Tajikistan
- Landslides in Tajikistan
- Reinforcement of river levees in the Shing region of Tajikistan

An example of best practice mentioned by GIZ is the assistance to the Mozambique National Institute of Disaster Management (INGC). GIZ is performing capacity building for INGC staff and improvement of disaster management capabilities of communities.

Mozambique National Institute of Disaster Management (Instituto Nacional de Gestão de Calamidades; INGC)[21](an extra-ministerial bureau of the Ministry of State Administration, located in the capital city Maputo) Receiving Technical Assistance from GIZ:

(Photo source: JICA (2013), “Final Report of the Information Collection and Confirmation Study on Assistance in Disaster Management, Agriculture, etc. Using Climate Change Prediction Model in Southern African Region”)

[21] Instituto Nacional de Gestão de Calamidades meanings “Institute of disaster management” in English.

【References】

GIZ "*Emergency Response and Recovery | Disaster Risk Management*"
GIZ(2012) "*Leistungangebot | Advisory service / Disaster Risk Management*"

2.2.2 French Development Agency AFD (Agence Française de Développement)

In 2011, French Development Agency (AFD) published the report "*The global strategy of France for reducing natural disaster risks*"[22]. According to this report, France organized the National Policy Board for the Prevention of Major Natural Hazards (Le Conseil d'Orientation pour la Prévention des Risques Naturels Majeurs; COPRNM) as a means to prepare for HFA in 2003 and started its activities in 2007. AFD had established "*Prevention of natural risks with global actions*"[23] in 2010, and has been conducting overseas activities in disaster management, focusing on the following four points.

- The positioning strategy to adopt at global level[24]
- The outlines to promote French products and the axis of its positioning[25]
- The initiatives for assumption of community level[26]
- The position and role of France within different requests of communities and global level[27]

【References】

AFD(2011) «La Stratégie française à l'international de réduction des risques de catastrophes naturelles »

[22] Original French: *La Stratégie française à l'international de réduction des risques de catastrophes naturelles*
[23] Original French : *Prévention des Risques Naturels et Actions Internationales*
[24] In French: *la stratégie de positionnement à adopter au plan international*
[25] In French: *les contours du produit France à promouvoir et les axes principaux de son déploiement*
[26] In French: *les initiatives à prendre au plan communautaire*
[27] In French: *la place et le rôle de la France au sein des différentes instances communautaires et internationales*

2.2.3 The Government of The Netherlands

The domestic disaster risk reduction system for flooding in the Netherlands is nearly identical to that of Japan, and the Dutch government's international disaster assistance is focused mainly on floods.

The Dutch government directly administers foreign aid. No document offering an overview of the Dutch government's disaster risk reduction has been posted online, but the website of the Third UN World Conference on Disaster Risk Reduction (held in March 2015) lists the following examples of the Dutch government's forethought to disaster risk reduction.

- Master plan for flood countermeasures in Mexico
- Flood countermeasure planning in coastal areas around the city of Tacloban in the Philippines
- Water resource management in Serbia

The Dutch government announced the establishment of the Dutch Surge Support (DSS) at the Third UN World Conference on Disaster Risk Reduction and is offering assistance for ensuring safety in the wake of disasters resulting from storm surges.

【References】

Ministry of Foreign Affairs, Government of the Netherlands (2015)
"*UN World Conference on Disaster Risk Reduction in Sendai, Japan*"[28]

[28]http1://www.government.nl/ministries/bz/events/un-world-conference-on-disaster-risk-reduction

2.2.4 Australian Agency for International Development (AusAID)

While many donors advocate "mainstreaming disaster risk reduction," AusAID is the one that is showing the most progress among major donor countries.[29]This agency was formed because Australia suffers many natural disasters, as do the recipients of Australian aid, many of which are in the Asia-Pacific region and have relatively high populations in addition. Pacific Island countries also have a deep relationship with Australia as recipients of its aid, and suffer the worst natural disaster damage in the world. [30]

AusAID published "Investment in a Safer Future" in 2009, clarifying the policies for disaster management in development cooperation. In specific terms, it has been conducting pilot project designed with disaster forethoughts in Indonesia, the Philippines, and Pacific countries.

In the Philippines, the projects concerning education, infrastructure, and restoration of the Manila metropolitan area featured the integration of disaster education into staff capacity building and the incorporation of disaster management plans into action plans. In Padang, Indonesia, AusAID conducted the "Build-Back-Better" educational campaign and reconstructed schools and hospitals. AusAid is implementing mainstreaming disaster risk reduction in collaboration with the United Nations, counterpart governments, and influential NGOs.

In fiscal year[31] 2009, 65% of the disaster management budget of AusAID was used for Asian regions, followed by 11% for Pacific countries and 10% for Africa. The assistance from AusAID is mainly targeted at the HFA Pillar 5, "Strengthen disaster preparedness for effective response at all levels."

【References】

AusAID (2009) "*Investing in a Safer Future - A Disaster Risk Reduction policy for the Australian aid program*"

Presentation material for ISDR Asia Partnership Meeting held in March 2010

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[29]Summary proceedings of the third study meeting on the JICA project study "Mainstreaming Disaster Risk Reduction" held on February 27, 2013

[30]http://dfat.gov.au/aid/topics/investment-priorities/building-resilience/disaster-risk-reduction-prevention-preparedness/Pages/disaster-risk-reduction-prevention-and-preparedness.aspx

[31] Fiscal year of Australia starts at 1 July and ends at 30 June next year.

2.2.5 UK Department of International Development (DFID)

"Defining Disaster Resilience" published by DFID in 2011 lists the following five requirements for disaster resilience.

- Financing
- Advocacy
- Network
- Knowledge and Evidence
- Integration

However, none of these goes beyond the explanation of abstract concepts. As examples of projects conducted by DFID, it lists the risk finance in Ethiopian famine, the development of an early warning system in Bangladesh, the support to the construction of roads and cyclone shelters and the promotion of crops resistant to climate changes as countermeasures for floods in the same country, the food security program in Africa conducted in cooperation with WFP, and the disaster education conducted in cooperation with an NGO in Pakistan.

【References】

DFID(2011) "*Defining Disaster Resilience: A DFID Approach Paper*"

2.2.6 United States Agency for International Development (USAID)

The material from USAID mentions the following "disaster forethought" projects.

- Cyclone shelters in Bangladesh
- Cyclone early warning system in Mozambique
- Food security measures in collaboration with the Peace Corps[32] (Malawi, Senegal, etc.)
- Development of earthquake observation network in Haiti and community disaster management in collaboration with NGOs
- Response to avian influenza (epidemic[33])
- Guidance on waste treatment and river and lake cleaning in flood-prone areas in the

[32] An international service organization of U.S. government. Peace Corps dispatches volunteers, which are U.S. citizens, to other countries.

[33] The disaster database "EM-DAT" includes epidemics in the definition of natural disasters.

Philippines

- Monitoring of locust plague and infestation[34]
- Landslide assessment by US Geological Survey (USGS)
- Construction of tsunami early warning system
- Construction of volcano monitoring system in Columbia
- Assistance in the establishment of the government agency in charge of natural disasters in South Africa
- Assistance in agriculture in the cold areas in Afghanistan

In the Unites States, disaster management is generally based on the principles of self-responsibility and after-the-fact responses, as mentioned at the beginning. This is considered to apply also to international development project. As evident from the above list, few projects include structural measures for disaster management. As of 2013, little consideration seems to be paid to the relationship between natural environment conservation and disaster management.

However, the United States has the world's largest network for disaster monitoring, and the data are offered for free via the World Wide Web[35]. USAID is also making effort in the development of observation and monitoring networks for insect pests (locust outbreaks), which severely damage agriculture. The United States clearly has a relative dominance over Japan in this respect, suggesting the possibility of sharing of roles between these two donor countries in disaster forethought.

【References】

USAID(2013) "*Hazard-Specific Disaster Risk Reduction Implementation Guide*"

[34]"EM-DAT" also includes insect plague and infestation in the definition of disasters.

[35]There are many databases such as NGDC Natural Hazards operated by NOAA. Global Risk Data Platform operated by the United Nations also uses the survey results from American research institutes as a source of data.

3. Techniques for Forethought to Disaster Risk Reduction

3.1 Approach to Cross-sectoral Issues

While JICA is providing development cooperation according to issues defined for each sector, there are some issues that affect more than one sector or all sectors, which are referred to as cross-sectoral issues. Among these issues, JICA has been working on the mainstreaming of peace building, gender equality, climate changes, and environmental and social considerations.

Dedicated departments and people in charge have been installed for these cross-sectoral issues. For future reference, we interviewed people in charge of each cross-sectoral issue about challenges, approaches and other efforts for JICA to act on cross-sectoral issues internally as they relate to forethought to disaster risk reduction, the focus of this study

3.1.1 Interviewing

We gathered information on the following items through conversational interviews. Table 3.1-1 shows divisions interviewed.

Aiming at mainstreaming disaster risk reduction, which is also across-sectoral issue, we conducted interviews with the persons in charge of cross-sectoral issues to collect information concerning the following matters.

- Background and context
- Present state of implementation
- Screening and scoping methods
- Roles of posts in charge (method of checking, education activities, measures for publicity)

Table 3.1-1 Implementation of interview for cross-sectoral issue

Cross-sectoral issue	Interviewee	Date of Interview
Peacebuilding	Office for peacebuilding and reconstruction Infrastructure and peacebuilding department	Sep. 19, 2014
Climate change	Office for climate change and environmental management group Global environment department	Sep. 22, 2014
Environment and social consideration	Environmental and social considerations supervision division Credit risk analysis and environmental review department	Sep. 22, 2014
Gender equality	Office for gender equality and poverty reduction Infrastructure and peacebuilding department	Sep. 29, 2014

3.1.2 Result of Interview

The following are points we used as references from interviews in departments in charge of cross-sectoral issues about challenges, approaches and other efforts for JICA to act on cross-sectoral issues internally.

- The introduction of the system for mainstreaming of a cross-sectoral issue requires sufficient prior explanation and continued education, and takes time before it is accepted widely.
- Current methods of screening in cross-sectoral issues are diversified, ranging from simple yes/no questions to the processes performed by a dedicated team and those requiring survey sheets.
- Screening is performed in the stage of needs survey in the implementation stage.
- Unless the process is made compulsory as part of the work flow, there is a risk that formal steps are considered unnecessary and omitted arbitrarily.
- Accuracy is ensured by having a particular team to perform checks.
- Scoping for environmental and social considerations is performed by management-level personnel (Category B) or the review section (Category A) depending on the results of the screening.
- The point of contact for consultation needs to be clarified for the operation of the system.

3.2 Study on Screening and Scoping Process Policies

3.2.1 Explanation of Terms for Forethought for Disaster Risk Reduction

The following are detailed explanations of the terms used in the course of considering disaster risk reduction: "forethought to disaster risk reduction," "screening," "scoping," and "screening and scoping personnel."

(1) Forethought to Disaster Risk Reduction

Specifically,

(i)To avoid projects from natural disasters

・Select sites that are relatively safe from disasters (move to high ground, avoid sloped land and riversides, etc.)

・In general, do not consider total withdrawal.

(ii)To add the capacity to respond to natural disasters in project

・Structure design that protects against destruction by disaster (quake-resistant structures, ground improvement, wind-resistant structures, drainage, etc.)

Structures that can resist damage from disasters (raised buildings and facilities, elevated floors

・Build disaster risk reduction facilities (river levees and dikes, seawalls, dams, slope protection, vegetation, flood control basins, etc.)

・Facility designs that limit disaster damage (linear structures)

・Improve readiness of non-technical disaster response

(iii)To enhance disaster risk reduction capacity on national, regional and community levels

・Build systems capable of disaster response, and associations with governments, public institutions and communities

・Secure evacuation routes and evacuation centers for when disasters strike

・Create hazard maps

・Disaster risk reduction education, evacuation drills

・Create community disaster risk reduction plans

Note that forethought to disaster risk reduction should be taken, but are not a requirement. Therefore, budgetary concerns or the wishes of the partner country's government could be reasons that forethought to disaster risk reduction are not taken. In addition, projects are not avoided in relation to the extent to which forethought to disaster risk reduction are taken, or whether they are or are not taken.

(2) Screening

Screening is the process of deciding on the necessity of studies to consider forethought to disaster risk reduction in development projects. This study looks at forethought to disaster risk reduction to determine the nature and necessity of disaster risk reduction measures. The screening determined which work to implement for disaster risk reduction measures, and whether or not to conduct studies to verify the necessity of those measures.

(3) Scoping

Scoping is the process of selecting study items needed for disaster forethought, which should be conducted if the results of a project planning study indicate the necessity of disaster forethought or, in the case where the project plan is developed without a project planning study, if it is deemed necessary that the project includes the study for disaster forethought.

In this study, we prepared scoping lists of items to be studied and organized them by sector and type of natural disaster.

(4) Screening and scoping personnel

One situation that requires extra care is when employees with little experience with disaster risk reduction are included among these personnel. Thus, we developed screening methods that can be implemented easily, and created scoping lists to help with the selection of study items for forethought to disaster risk reduction and a document (the "Handbook for Mainstreaming Disaster Risk Reduction" (Forethought to Disaster Risk Reduction for Development Project)) that exhaustively explains how to use the methods and list and presents examples of forethought to disaster risk reduction.

3.2.2 Scope of Screening and Scoping

The nature of screening and scoping depends on who or what is affected by hazards, and also by the distribution of those affected in points, lines or planes. For example, screening and scoping at a point involves considering the effects of the hazard at that point and the surrounding area, including relocation from the viewpoint of disaster risk reduction. Screening and scoping along a line adds to the considerations the possibility that a disaster response measure, such as controlling the flow of water with banking structures during a flood, itself could cause a disaster. When the area in question is a plane, such as in urban planning and watershed management, it is necessary to make disaster risk reduction capacity as it applies to the project more resilient by considering policies for making the areas more robust in the face of disasters and for responding to the disasters. Therefore, different types of scoping must be created for each sector.

In this study, the need for forethought to disaster risk reduction by screening differed by area, thus area characteristics were studied and considerations made for different types of disasters and sectors.

(1) Projects that require Scoping and screening

All types of development projects implemented by JICA are subject to scoping and screening. JICA works in the sectors of thematic departments, and identified 23 sectoral issues (JICA Knowledge Site[36]). Among them, 18 issues shown in Table 3.2-1 are development projects which JICA is directly implementing. These issues are assigned to each thematic department.

[36] http://gwweb.jica.go.jp/KM/KM_Frame.nsf/NaviSubjMain?OpenNavigator

Table 3.2-1 JICA's thematic issue and department in charge

Sectors	Related projects	Thematic Departments
Urban / Regional Development	Urban planning, Regional development, Industrial Park(complexes)	Infrastructure and Peacebuilding Department
Transportation	Road Airport Port and Harbor Urban transportation	
ICT	Communication facilities, Broadcast system	
Gender and Development		
Peacebuilding		
Poverty Reduction		
Private Sector Development	Industrial infrastructure, Tourism development	Industrial Development and Public Policy Department
Natural Resources and Energy	Electric power plants, Electric power distribution, Mining development	
Governance	Legal and judicial systems, Public administration	
Economic Policy	Fiscal management and financial systems	
Education	Schools, Education systems, Training	Human Development Department
Social Security	Support for person with disability, Pensions, Social insurance	
Health	Hospitals	
Natural Environment Conservation	Forests Natural environment Conservation	Global Environment Department
Environmental Management	Waste management Sewage	
Water Resources and Disaster Management	Urban water supply, Rural water supply	
Climate Change		
Agricultural/Rural Development	Rural development Irrigation	Rural Development Department
Fisheries	Local fishing communities, Fisheries	

(2) Types of disasters covered by forethought to disaster risk reduction

According to UNISDR (2009), disasters are events that significantly disrupt the functions of communities and societies suffering from hazards which cause disasters. UNISDR also noted that the definition of disaster often includes "exposure to hazards," "a state of vulnerability at a particular point in time," and "a lack of capacity or measures for reducing or responding to potential negative effects." In other words, disasters occur when exposure, that is a community or a society, which is vulnerable and lacks the capacity to respond is struck by hazard, and exist in the following kinds of relationships.

(VULNELABILITY+HAZARD+EXPOSURE) / (CAPACITY) = DISASTER[37]

Disaster hazards are generally divided into natural hazards and technological or man-made hazards. In addition, those arising from human activities can be categorized as socio-natural hazards. This study targets at natural disasters. Among the types of natural hazards, biological hazards are excluded because of the difficulty in prediction and control. Among the other natural hazards, we included in the coverage the eight types of hazards that can inflict huge impact: flood, tropical cyclone, storm surge, landslide, tsunami, earthquake, volcano, and drought (Table 3.2-3).

[37] Arranged the information on IFRC website. In original, (VULNERABILITY+ HAZARD) / CAPACITY = DISASTER
https://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/definition-of-hazard

Table 3.2-2 UNISDR definitions of terms related to disaster.

Term	Definition	Comment
Disaster	A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.	Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.
Hazard	A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.	Hazards arise from a variety of geological, meteorological, hydrological, oceanic, biological, and technological sources, sometimes acting in combination. They are called "Biological hazard", "Geological hazard", "Hydrometeorological hazard", "Natural hazard", "Socionatural hazard" and "Technological hazard", respectively. In technical settings, hazards are described quantitatively by the likely frequency of occurrence of different intensities for different areas, as determined from historical data or scientific analysis.
Disaster Risk	The potential disaster losses, in lives, health status, livelihoods, assets and services, which 10 could occur to a particular community or a society over some specified future time period.	"Risk" is defined as the combination of the probability of an event and its negative consequences. "Risk" has two distinctive connotations: in usage the emphasis is placed on the concept of chance or possibility, and on the consequences. In technical settings, the latter is usual. "Disaster risk" is categorized in the latter. The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, in broad terms at least.
Exposure	People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.	Measures of exposure can include the number of people or types of assets in an area. These can be combined with the specific vulnerability of the exposed elements to any particular hazard to estimate the quantitative risks associated with that hazard in the area of interest.
Vulnerability	The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.	There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. Vulnerability varies significantly within a community and over time. This definition identifies vulnerability as a characteristic of the element of interest (community, system or asset) which is independent of its exposure. However, in common use the word is often used more broadly to include the element's exposure.

Source: UNISDR(2009) "UNISDR Terminology on Disaster 2009"

Table 3.2-3 List of Types of Natural Hazards

Coverage of this study	Hazard*	Remarks	Classification*
○	Flood		Hydrometeorological hazard
○	Tropical cyclone	This refers to tropical cyclones, which are called differently in different regions as typhoon, cyclone, and hurricane. Treated as synonymous to storm.	Hydrometeorological hazard
○	Landslide	This includes sediment disasters in general. Not only landslides but also collapse of cliffs and steep slopes and debris flow (flush floods) are included. Debris flow includes volcanic mud flow.	Geological hazard
○	Storm surge	While this is often caused by a tropical cyclone, low pressure systems other than tropical cyclones can also be a cause.	Hydrometeorological hazard
○	Earthquake		Geological hazard
○	Tsunami	Note that the cause is not limited to an earthquake. Submarine eruption and massive landslide can also be a cause.	Difficult to classify *Related to both geology and hydrometeorology
○	Volcano	The target is the disaster associated with eruption.	Geological hazard
○	Drought	This is treated as a hazard affecting agriculture. Impact on water supply and other aspects are not considered.	Hydrometeorological hazard
	Heavy snow		Hydrometeorological hazard
	Extreme temperature	Extreme high temperature Extreme low temperature	Hydrometeorological hazard
	Avalanche		Hydrometeorological hazard
	Wild fire		Hydrometeorological hazard
	Disease epidemics		Biohazard
	Animal / Insect palgues		Biohazard

Note: Types of hazards have been defined referring to the IFRC website https://www.ifrc.org/en/. Hazard classification is based on "UNISDR Terminology on Disaster Risk Reduction 2009" (UNISDR, 2009)

3.2.3 Interviews with Thematic Departments

Information gathered from interviews of thematic departments conducted as part of this study served as the base for considering the extent to which to conduct screening and scoping for forethought to disaster risk reduction. Thus, many considerations were made based on examples of grant aid and technical cooperation implemented by thematic departments. In addition to interviews, thematic department participation was also requested for pilot trials, and they will be discussed later.

(1) Purpose of Interviews

We conducted interviews with thematic issue departments to obtain opinions concerning the present state of implementation of disaster forethought and the future introduction of the screening and scoping processes. Opinions were solicited mainly focusing on the following points.

- Explanation of the plan for compulsory disaster forethought
- Opinions concerning screening in all development projects
- Opinions concerning screening methods
- Opinions concerning the study items that should be added to the scoping list
- Collection of information concerning disaster forethought that are already implemented in each thematic department
- Opinions concerning the introduction of screening and scoping processes

The interview was conducted shown in Table 3.2-4.

Table 3.2-4 Time schedule of the interview with JICA Thematic Departments

Sector	Thematic Department	Date
Agriculture / rural development	Rural development Dep.	Oct. 10, 2014
Urban / regional development	Urban and regional development group Infrastructure and peacebuilding Dep.	Oct. 10, 2014
Transportation	Transportation and ICT group Infrastructure and peacebuilding Dep.	Oct. 10, 2014
Peacebuilding	Office for peacebuilding and reconstruction Infrastructure and peacebuilding Dep.	Oct. 14, 2014
Water Resources	Senior advisor (Water supply and sanitation)	Oct. 15, 2014
Education	Basic education group Human development Dep.	Oct. 16, 2014
Social security	Social security group Human development Dep.	Oct. 16, 2014
Health	Health group 1 Human development Dep.	Oct. 16, 2014
(Grant aid)	Financial cooperation implementation Dep.	Oct. 17, 2014

(2) Interview results

The following is a summary of information gathered from interviews.

(i) Introduction of processes for disaster risk reduction consideration

- All members will not consider disaster risk reduction unless considerations are made a requirement for moving forward with the project, or are otherwise enforceable. JICA has many checklists, but because following them is not enforceable, they have fallen out of use, and in some cases people decide individually whether or not to follow them. Additionally, thematic departments sometimes do not check the results of screening completed through needs surveys regarding environmental and social considerations.
- JICA employees must be taught about the importance of forethought to disaster risk reduction even as the increase of costs and JICA employee responsibilities are considered.
- There have been cases where forethought to disaster risk reduction have been overdesigned, and cases where measures were insufficient once disaster struck; JICA needed a uniform outlook on these considerations.
- An ideal screening and scoping process is a system that brings to focus points that warrant consideration or forethought to disaster risk reduction that have been performed to date without specific attention.
- Half of agricultural projects are run directly. Terms of reference are not always created, thus explanations of how to use scoping are insufficient.
- The significance of screening and the awareness of disaster risk reduction screening can bring to construction must be fully explained for civil engineering projects.

(ii) Considerations of disaster risk reduction

- As can be expected, considerations have been made for civil engineering (social infrastructure improvement, agricultural, fishery) and construction (schools, hospitals, etc.) projects.
- However, in some cases in the urban planning and construction sectors, JICA employees are unaware that they are leaving considerations to consultants
- Normally, considerations regarding volcanoes were not made.
- Tsunami measures are not taken when costs are too high, and cannot be taken in the many cases where there is insufficient data.
- Normally, measures against earthquakes are taken for buildings, and Japanese earthquake-resistance standards are often used because many partner countries do not

have their own. It is difficult to make decisions on the implementation of earthquake countermeasures for anything other than buildings.

- When there is no history of storm surges over the past 10 years, considerations are sometimes deemed unnecessary.
- Forethought to disaster risk reduction for water resources have already been organized, and are uniformly issued with terms of reference and implemented.
- In technology transfers for water supply facility operation, there are cases where it is impossible from the partner country's standpoint to add disaster risk reduction education to the list of regular guidance.
- Considerations are carried out in the establishment of health care referral systems regardless of whether or not disasters are a factor.
- Points to consider in disasters in the health care field include securing roads and pathways during disasters, the effects and range of disasters, the condition of telecommunications infrastructure, the selection of hub hospitals and drafting of response plans for disaster situations, and the relating of these to local and national disaster risk reduction plans.
- While possible to consider relocating schools to avoid disaster risk, this is generally only when special circumstances apply. Relocation has never been added to scoping lists.
- Specific forethought to disaster risk reduction have not been included in projects concerning education, but such considerations are imaginable as part of school operation, hazard map creation, response for children who do not attend school, etc.
- Forethought to disaster risk reduction for projects concerning social insurance are imaginable for establishing systems, assistance establishing legislation, etc.

(iii) Screening

- For projects concerning agriculture or water resources, it is often the case that the target area is yet to be determined when the request is made. However, as it is difficult to envision adding study team members once the target area has been determined, screening and scoping should be done before the project begins.
- Screening for civil engineering projects is effective toward selecting items that do not require consideration.
- Considering whether to include drought as a type of disaster for non-agricultural projects: Droughts are highly relevant in the water resources field.

- Forethought to disaster risk reduction cannot be made for financial, health (maternal and child health, pension, etc.), agricultural technology transfer and non-revenue water measures.

(iv) Scoping

- The results of the content written in the terms of reference must be checked, thus attention must be paid to how scoping checklists are created and used.
- Scoping can be used effectively in areas that have no direct relationship to disaster risk reduction.
- Consider adding scoping lists to guidelines for creating grant aid reports.

3.2.4 Study on the Timing of Screening and Scoping Processes

(1) JICA's Development Cooperation Schemes

JICA's development aid can be largely classified into three categories: technical cooperation, grant aid and loan assistance. Projects progress differently for each category, and screening and scoping implementation periods must be considered for each. Tables 3.2-5, 3.2-6 and 3.2-7 show the flow of technical cooperation, grant aid and loan assistance projects.

Table 3.2-5 JICA assistance techniques and flow (Technical Cooperation)

■Technical Cooperation

The five technical cooperation

(1) Technical cooperation projects

Projects are implemented with the appropriate combination of expert dispatch, acceptance of technical training participants, provision of equipment, etc.

(2) Technical cooperation for development plan

Transfer of technology regarding study and analytical methods, techniques for drafting plans, etc.

(3) Expert dispatch

Dispatch experts to the site of the cooperation and have them teach the required techniques and knowledge to the counterparts in addition to working together with them to develop, educate and spread locale-appropriate technology and systems.

(4) Acceptance of technical training participants

Invite people from developing countries to Japan for training.

(5) Provision of equipment

Provide required equipment to partner countries to go along with experts and other efforts in order to cooperate efficiently.

(i) Identify and formulate projects

Projects are identified and formulated through JICA cooperation with partner country governments, and information gathering, preparatory studies and other work by JICA's overseas offices.

↓

(ii) Request to adoption

The Japanese Ministry of Foreign Affairs, related ministries and JICA consider whether or not to approve projects based on requests from partner countries.

If approved, the Japanese government notifies the partner country's government and exchanges verbal notes regarding cooperation on the basis of diplomatic missions.

↓

(iii) Considerations/ex-ante evaluations

Once studies have been conducted for drafting detailed plans, ex-ante evaluations on the five aspects of relevance, effectiveness, efficiency, impact and sustainability are implemented to clarify the nature and expected outcomes of cooperation on the project as well as to comprehensively examine its appropriateness.

↓

(iv) Implementation/promotion of progress (monitoring)

JICA and the implementing agency in the partner country's government conclude a written agreement (Record of Discussions (R/D)) regarding the implementation, nature of activities and required measures of a project.

During project implementation, both JICA and the implementing agency promote the progression of the project through regular monitoring to ensure the manifestation of outcomes of cooperation based on plans devised during the planning stage. The two verify the outcomes when the project is completed.

↓

(v) Follow-up/ex-post evaluation

Normal projects are complete after going through a set period of cooperation, but supplementary assistance will be provided as necessary. Ex-post evaluations are performed several years after the completion of a project, and the evaluation results are used as lessons on the creation and implementation of similar projects.

Source: Created based on the JICA website

Table 3.2-6 JICA assistance techniques and flow (Grant Aid)

■Grant Aid

Grant aid is given mainly for the technical aspects of cooperation - for the construction of hospitals, schools, roads and other facilities in essential fields such as medical care, urban and rural water supply and shipping transportation, and for the procurement of medical instruments and equipment, educational and training materials and other materials.

(i) Partner country requests cooperation, search for projects

(ii) Preparatory study for cooperation

Consider the content, objectives, background and outcomes of development plans related to the project, and when implementing grant aid, the content, appropriate scales and environments and other minimum conditions as checkpoints in considering the public nature of the project as well as the management and operation systems, relationship with technical cooperation projects and other factors.

(iii) Appraisal

JICA receives the request for cooperation from the partner country and reviews the content of the proposed cooperation based on study reports and other related documents. Based on the JICA's appraisal, the Japanese Ministry of Foreign Affairs works with the Japanese Ministry of Finance to secure the required funding, going through the required procedures and finally having a cabinet meeting to decide upon the implementation of the cooperation.

(iv) Exchange of notes and grant agreement

After the cabinet's decision, the partner country's government and the Japanese embassy in that country sign (exchange) notes that include the objectives and details about the cooperation. In light of the exchange of notes, JICA and the partner country's government enter into a grant agreement.

(v) Project implementation

The leader of implementation is the partner country's government (agency), which guides and manages the project so that it progresses smoothly. The implementing agency makes recommendations and facilitates contact with the partner country's government and consultants and offers guidance to them over the series of procedures from concluding agreements until construction of facilities is complete and machinery and equipment are delivered so that facilities are built and machinery and equipment procured properly and without delay.

(vi) Follow-up/ex-post evaluation

JICA performs an evaluation to check the outcomes of a project after a set amount of time has passed since its completion. Comparing and investigating conditions during screening and after completion, and analyzing the outcomes of cooperation will be reflected in planning and implementation methods for future cooperation projects.

Partner country governments maintain individual projects after cooperation is complete, but damage to machinery and equipment, lack of funds and other factors have caused unforeseen problems and impaired project operation. In these situations, JICA offers follow-up cooperation as necessary, and assists partner countries so that they can sustain the outcomes of the cooperation.

Source: Created based on the JICA website

Table 3.2-7 JICA assistance techniques and flow (Loan Assistance)

■Loan assistance (ODA loans)

Loan assistance helps developing countries in their efforts to develop by providing long-term, low-interest loans for development to those countries. Most loan assistance projects are for improving economic and social infrastructure, but loan assistance can be provided in any development field, including educational and medical facilities and systems, and energy and resource development. Loan assistance is proactively provided in fields that contribute to poverty reduction, peacebuilding and response to global-scale problems.

There are many developing countries throughout the world, but many partner countries for loan assistance are in the Asian region with which Japan has a deep relationship.

Because these loans must be repaid, they encourage the efficient use of funds and appropriate project supervision by developing countries, which lead to development of those countries. For Japan, the loans are a sustainable method of cooperating at a low financial cost.

(i) Project preparation

Feasibility studies are conducted and implementation plans created for projects for which partner countries have requested cooperation. Sometimes the partner country conducts a feasibility study, and other times JICA conducts one as part of its preparatory study.

(ii) Request for cooperation

The partner country requests cooperation by submitting an official request along with the results of feasibility studies and implementation plans to the Japanese government.

(iii) Appraisal, ex-ante evaluations

The Japanese government and JICA consider projects for which partner countries have requested cooperation, and JICA appraises them.

Given the results of the JICA screening, the Japanese government decides whether or not to provide ODA loans, and determines loan amounts, conditions and other terms.

(iv) Exchange of notes and loan agreement

The governments of Japan and the partner country conclude a written document containing specific decisions regarding the ODA loan. Then JICA and the partner country's government enter into a loan agreement.

(v) Project implementation

JICA executes the loan, and the partner country assumes the responsibility of implementing the project.

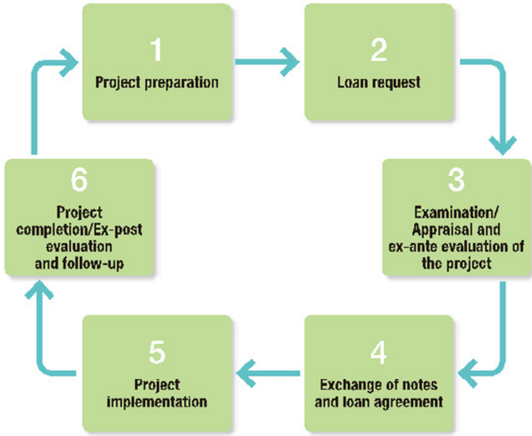
JICA gains a full understanding of the progress of the project and makes recommendations and does other interim management work as necessary so that projects are implemented smoothly. In addition, JICA conducts studies for implementation assistance as necessary.

(vi) Completion/ex-post evaluation, ex-post supervision

A third party will conduct an ex-post evaluation after projects are complete, and a report of the evaluation will be publicized so that the findings can be used in the search for future projects as well as their preparation, screening and supervision. Partner countries are responsible for operating and maintaining completed projects, but JICA will gain a full understanding of whether or not projects are operated smoothly, and make recommendations through ex-post supervision as necessary.

(vii) Feedback

The lessons, recommendations and other information obtained from ex-post evaluations will be used in new projects.



Loan Assistance Project Cycle

Source: "JICA Annual Report 2014"

Source: Prepared based on the JICA website and Sato, Hiroshi (supervising editor, 2014) "*Lexicon of International Cooperation, Version 4*" (International Development Journal, Tokyo).

(2) Study on the Timing of Screening and Scoping Processes

The flow from the request for a JICA development project to the implementation of the project is shown in Figure 3.2-1.

It was considered that the timing of the implementation of screening and scoping must satisfy the following conditions.

- Because the result of disaster forethought is not likely to make a project impossible, screening should be conducted after the decision of the implementation of a project. In other words, it should be conducted after "approval."
- JICA personnel must be aware of disaster forethought. Namely, it must be conducted before the study is commissioned to a consultant. The earliest timing of the commissioning to a consultant corresponds to the time of the preliminary study (or pilot study) for the preparatory study or the time of the preparatory study in the case of a grant aid project and the time of the detailed planning survey in the case of technical cooperation. Screening and scoping must be conducted prior to this time.
- After JICA personnel grasp the necessity of disaster forethought, development of specific details is commissioned to the consultant. It is therefore necessary that the direction of the services commissioned to the consultant must specify the study items needed for disaster forethought.

As a result of the above examination, the timing of screening was decided to be a time after approval and before the commencement of the preparation of the work instruction. Scoping is conducted at the earliest time of preparation of work instruction for commissioning consultant services. For this reason, it was decided that screening and scoping are conducted by thematic departments.(Figure3.2-1 & 3.2-2)

The result of interviews clarified that the screening concerning cross-sectoral issues is currently conducted at the stage of needs surveys. In addition, in order to respond to recent disaster information that is not reflected in databases and also to detailed site information, we proposed that the official request should have a space in which the counterpart government can describe requests concerning disaster risk reduction and that the survey sheet should be designed to enable the overseas office with extensive knowledge of local information to check hazards requiring considerations. Relevant regional department, in response to the survey sheet checked by the overseas office, is hence obliged to inform thematic department about the matters requiring disaster forethought. It was decided that scoping is conducted for the disaster types that were deemed to require disaster forethought at the stage of the needs survey.

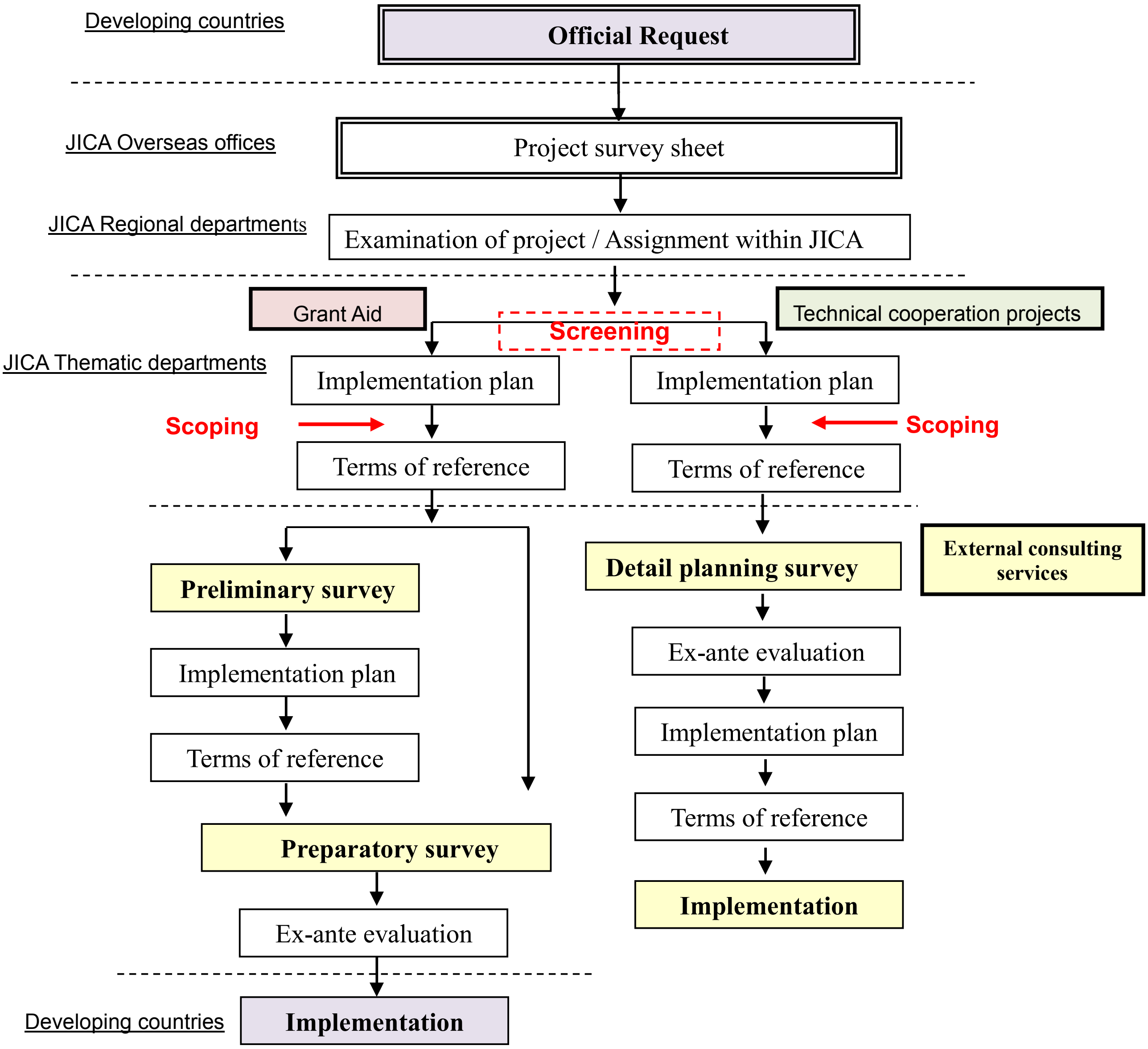
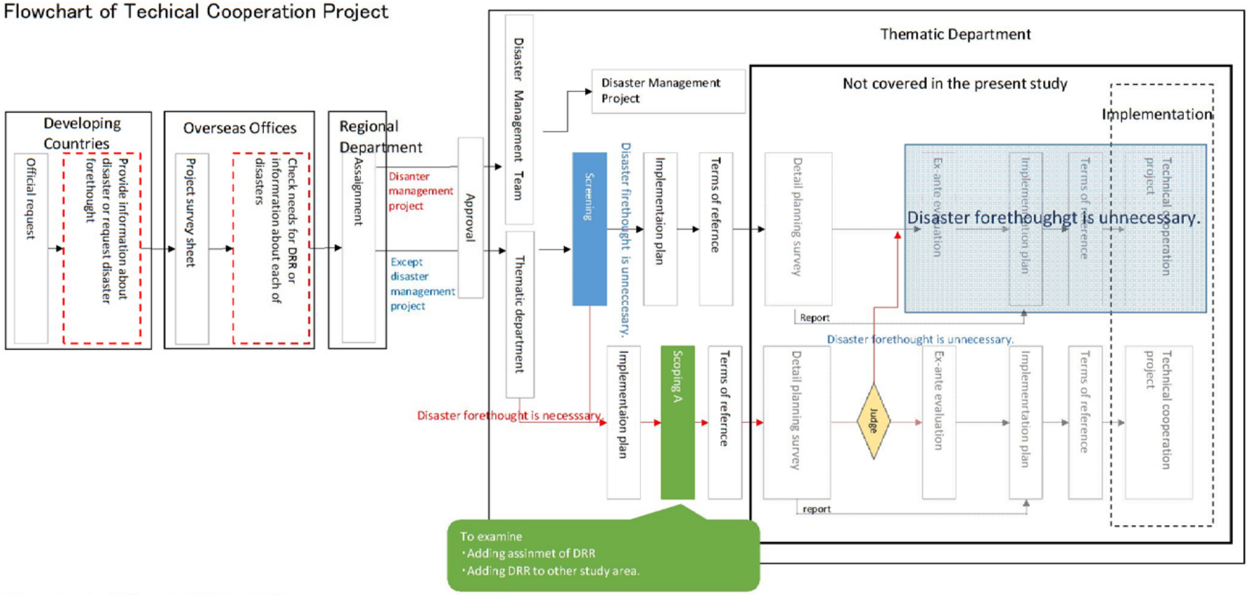


Figure 3.2-1 Flowchart of JICA's development projects (for Technical cooperation and grant aid)

Flowchart of Techical Cooperation Project



Flowchart of Grant Aid Project

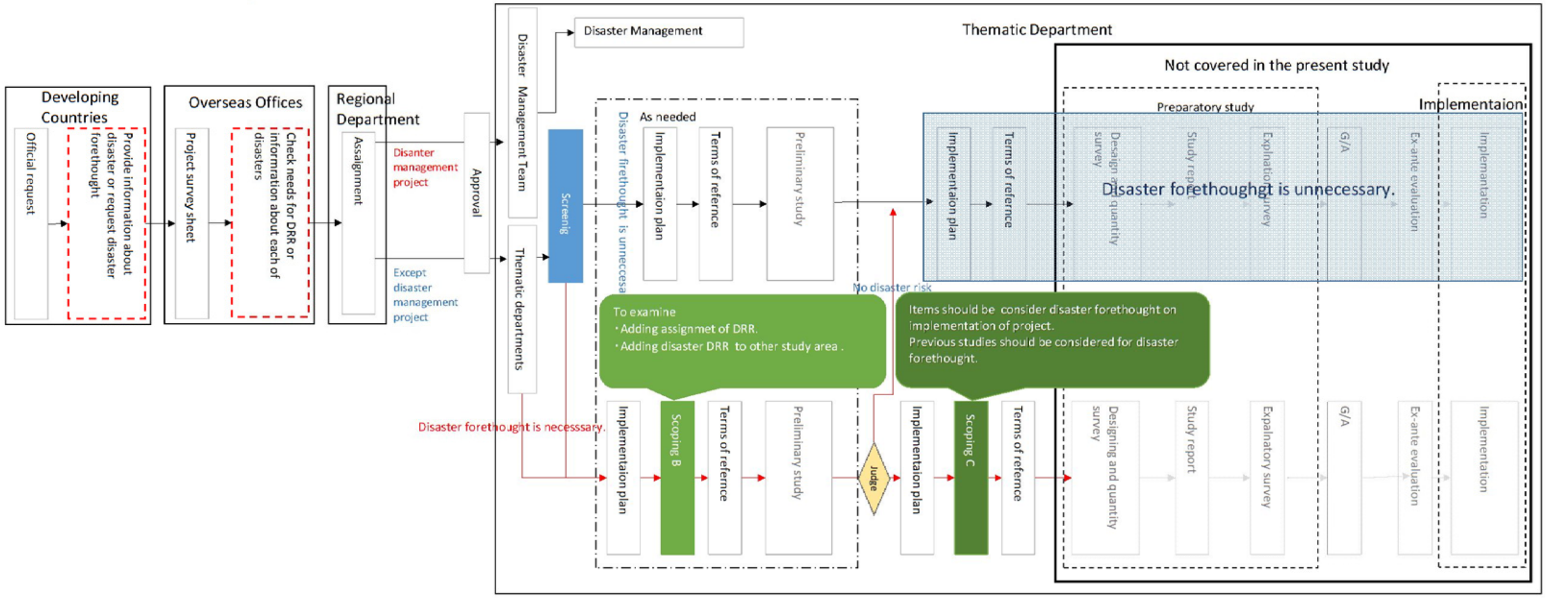


Figure 3.2-2 Flowchart of procedure of forethought to DRR in JICA's development project

4. Natural Disaster Risk Information Sources

4.1 Selection of Natural Disaster Risk Information Sources

Natural risk information sources were reviewed to find suitable information sources for the screening. The information sources should provide the information stably, and since JICA projects are implemented all over the world, the database should provide information for sources all over the world.

Ideal databases should fulfill the following requirements;

- Provide information on flood, cyclone, high tide, earthquake, tsunami, volcano and drought.
- Run by reliable organizations
- Provide reliable information free of charge
- Provide information through the internet
- Provide information all over the world
- Provide information on small grids and can identify the situation of project sites
- Easy to operate
- No need to install any application software

Table 4.1-1 shows the information sources available for the screening.

Table 4.1-1 Information Sources on Natural Disaster Risk

Data Source/ Information Availability	Disasters/ Icon to be refereed	Grid scale/ Classification/Explanation	Notes
Global Risk Data Platform by UNEP/ UNISDR TOP page：http://preview.grid.unep.ch/ Refer to：http://preview.grid.unep.ch/index.php?preview=map&lang=eng All over the world	Flood (Hazards → Flood Frequency (100))	Grid: about 1km 3 classifications (1-5 events / 5-50 events / more than 50 events) (based on frequency of flood occurrences in 100years which is calculated from flood distribution modeling using global scale runoff analysis (Herold & Mouton, 2011) and the record of floods occurrences	There are some cases of flood occurrences in the areas where the possibility is categorized as low. The actual situation of the project site should be carefully taken into account.
	Cyclone (Hazards→ Frequency)	Grid: about 2km 5 classifications (less than 0.25 event / 0.25-0.50 event / 0.50-0.75 event / 0.75-1.00 event / 1.00-1.24 events) (based on annual occurrence distribution which is calculated from Saffir-Simpson Hurricane Scale. The scale is based on the tropical cyclones which occurred during 1969-2009 and revised model of Holland (1980).	Even if the level of the hazard is small, there is still a possibility of a cyclone. The levels should be considered as a relative value.
	Landslide (Hazards→ Landslides PR)	Grid: about 1km 4 classifications (Low / Medium / High / Very High (based on annual distribution of landslide occurrences mainly in Europe from multivariate analysis using 6 parameters (response variable, slope, geological condition, soil water, vegetation, rainfall, earthquake)	It is preferred to use topographical maps and satellite image additionally to confirm the hazard in detail.
	Earthquake (Hazards →Earthquakes MMI)	Grid: about 10km 4 classifications (5-7 / 7-8 / 8-9 / more than 9) (based on simulation of peak acceleration and amplitude velocity. Distance from the epicenter, crustal structure, lithological and soil condition are used as the parameters.)	There is no classification for under level 4. Level 4 is defined that people may feel it when they are inside buildings or sleeping. The actual situation of the project site should also be carefully taken into account.
	Tsunami	Grid: about 1km	Tsunamis caused by landslides,

Data Source/ Information Availability	Disasters/ Icon to be refereed	Grid scale/ Classification/Explanation	Notes
	(Hazards→ Tsunami)	5 classifications (less than 0.2 / 0.2-0.4 / 0.4-0.6 / 0.6-0.8 / 0.8-1.0) (based on distribution of occurrences in once in 500 years probability which is calculated from existing Tsunami hazard maps and numerical modeling analysis of some areas.)	bedrock fall and volcanic eruption are not included. The actual situation of the project site should also be carefully taken into account.
	Drought (Past Events →Drought events)	Grid: about 50km No classification. The data is based on drought occurrences in the past. (based on standardized rainfall index of grid data set of world monthly rainfall)	The actual situation of the project site should also be carefully taken into account.
U.S. Socioeconomic Data and Applications Center by NASA U.S.A TOP page： http://sedac.ciesin.columbia.edu/ Refer to： (Maps/MAP VIEWER page) http://sedac.ciesin.columbia.edu/maps/client All over the world	Flood (Hazards→ Flood Hazard Frequency and Distribution)	Grid: about100km 4 classifications(1-2/ 3-5/ 6-11/ 12-25)	There could be cases that disasters were not recorded. The actual situation of the project site should also be carefully taken into account.
	Cyclone (Hazards→ Cyclone Hazard Frequency and Distribution)	Grid: about 5km 4 classifications (1-5/ 6-15/16-30/ 31-65)	
	Landslide (Hazards→ Landslide Hazard Frequency and Distribution)	Grid: about 5km 8 classifications(Negligible to Very Low/ Low/ Low to Moderate/ Moderate/ Medium/ Medium to High/ High/ Very High)	

Data Source/ Information Availability	Disasters/ Icon to be refereed	Grid scale/ Classification/Explanation	Notes
	Earthquake (Hazards→ Earthquake Hazard Frequency and Distribution)	Grid: about 50km 4 classifications (1-10/ 11-50/ 50-100/ 100-)	
	Volcano (Hazards→ Volcano Hazard Frequency and Distribution)	Grid: about 50km 4 classifications (1-10/ 11-30/ 31-60/ 61-130) (classified into 4 classes which Volcanic Explosivity Index is 2 to 8 among the volcanos which erupted in 1079 to 2000)	
	Drought (Hazards→ Drought Hazard Frequency and Distribution)	Grid: about 200km 5 classifications (0/ 1-3/ 4-6/ 7-10/ 11-19)	
Google Maps https://www.google.co.jp/maps?source=tldso All over the world Google Earth http://www.google.co.jp/intl/ja/earth/ (for install) All over the world	Flood, Storm Surge, Landslide, Tsunami	Confirm project sites through satellite photograph Focuses should be given to the following; Flood: if the sites are located in deltas of large rivers/ if the sites are located along the rivers Storm surge: if the sites are located in coastal areas Landslide: if the sites are located on slopes of mountainous or hilly and its adjacent areas. Tsunami: if the sites are located in coastal area/ if the sites are locates under the elevation of 35m	There is a possibility that the current situation differs from the image shown on Google Maps and Google Earth. The latest situation of the project site should also be taken into account.

Data Source/ Information Availability	Disasters/ Icon to be refereed	Grid scale/ Classification/Explanation	Notes
National Geophysical Data Center (NGDC) By NOAA TOP page: http://ngdc.noaa.gov/ngdcinfo/onlineaccess.html All over the world	Earthquake (Hazards→ Earthquake →Natural Hazards Interactive Viewer →Significant Earthquakes)	5 classifications (0/ 1-50/ 51-100/ 101-1000/ 1001-) (based on the number of death from major earthquakes)	There is a possibility that there are some disasters which are not reflected to the database.
	Tsunami (Hazards →Tsunami→ Natural Hazards Interactive Map)	5 classifications (0/ 1-50/ 51-100/ 101-1000/ 1001-) (based on the number of death from tsunami (volcanic, landslide, earthquake based cause)	
	Volcano (Hazards→Volcano→Natural Hazards Interactive Map)	5 classifications (0/ 1-50/ 51-100/ 101-1000/ 1001-) (based on the number of death from major volcano eruption)	
EM-DAT by CRED TOP page: http://www.emdat.be/ Refer to: http://www.emdat.be/database All over the world	Flood, Cyclone, Landslide, Earthquake, Volcano, Drought	Enter period to be focused and name of country in "Advanced Search" and select "Disaster subgroup". The result shows Damage on lives Record of disaster occurrences in the past is also available by using "Natural Disasters" icon under "Country Profile" (Information available from 1900 to up today)	The data is shown in country wise and therefore it is difficult to get information specifically for the project sites.

Data Source/ Information Availability	Disasters/ Icon to be refereed	Grid scale/ Classification/Explanation	Notes
Des Inventar by UNSIDR/ UNDP： TOP page： http://www.desinventar.net/index_www.html Asia: 18 countries Africa: 8 countries Europe: 3 countries Latin America: 19 countries	All major disasters Refer to : http://www.desinventar.net/DesInventar/showdatacard.jsp?clave=5644&nStart=0	Select country and disaster type, or select the area from "Province". The result page shows graph of disasters occurred in the past, information on damage on lives and damage on property	Level of information availability differs from country to country.
Dartmouth Flood Observatory TOP page： http://floodobservatory.colorado.edu/Archives/index.html All over the world	Flood Refer to： http://floodobservatory.colorado.edu/Archives/index.html ("Global Surface Water record"→ Click the grid which includes project area)	The result page shows the record of flood occurrence on the map	Information from 1985 is available. However, the level of information availability differs from country to country The latest update is in 2010 and data from 2011 is not available
National Climate Data Center by NOAA TOP page： http://www.ncdc.noaa.gov/oa/climateresearch.html All over the	Cyclone (Extreme Weather and Climate Events (Maps, Tables, Reports)→ Worldwide Weather & Climate	Map of cyclone and record for the periods of 1991-2000／2001-2011／2012- are available	The result shows all records in the world, and data of the country has to be identified from the list The record is available in the form of a report. Therefore, it will take some time to obtain information

Data Source/ Information Availability	Disasters/ Icon to be refereed	Grid scale/ Classification/Explanation	Notes
world	Events)		
Global CMT Web Page by Columbia University and Harvard University TOP page：http://www.globalcmt.org/ All over the world	Earthquake Refer to：http://www.globalcmt.org/CMTsearch.html	Record of earthquake occurrence is available by period, latitude/ longitude and the seismic intensity	Data since 1976 is available. Information on latitude/ longitude is needed to use the database
Composite Earthquake Catalog by Northern California Earthquake Data Center TOP page：http://www.ncedc.org/anss/ All over the world	Earthquake Refer to：http://quake.geo.berkeley.edu/anss/catalog-search.html	Record of earthquake occurrences are available by period, seismic intensity, latitude/ longitude to "Select earthquake parameters" The data which can be obtained on "Earthquake – Events" of GRDP is based on this database	Data since 1898 is available Information on latitude/ longitude is needed to use the database
	Earthquake Refer to：http://www.ncedc.org/anss/maps/cnss-map.html	Select "World Map Mollweide Projection" or "World Map Robinson Projection", and click the period. The result shows the location of earthquakes and the depth of hypocenter	Data is available for 1946-1997 There is a difficulty to identify the specific location of earthquake occurrences from the result map

Data Source/ Information Availability	Disasters/ Icon to be refereed	Grid scale/ Classification/Explanation	Notes
Smithsonian Institution National Museum of Natural History Global Volcanism Program by National Museum of Natural History (Washington D.C) TOP page: http://www.volcano.si.edu/ All over the world	Volcano Refer to： http://www.volcano.si.edu/search_volcano.cfm	Select country in "Country", or select the location on the map. The result shows the record of volcanic eruption (the data is based on last 10,000 years)	The result can be obtained easily. However, there is a possibility that there are some volcanic eruptions which are not reflected in the database.
	Volcano Refer to： http://www.volcano.si.edu/learn_products.cfm?p=9 http://www.volcano.si.edu/ge/GVPWorldVolcanoes.kml (for when Google Earth is already installed)	Install Google Earth and open the KML file which is down loaded from "Holocene Volcanoes Network" The result shows the basic volcanic information of all over the world on Google earth	
	Volcano Refer to： http://www.volcano.si.edu/learn_products.cfm?p=9 http://www.volcano.si.edu/news/WeeklyVolcanoGE.kml (for when Google Earth is already installed)	Install Google Earth, and open the KML file which is downloaded from "Smithsonian / USGS Weekly Volcanic Activity Report Network". The result shows the recent activities of volcanos.	

4.2 Database to be Used for Screening

(i) Global Risk Data Platform

After consideration of the each database mentioned above, “Global Risk Data Platform” was selected as the main database for the screening for the following reasons:

- All focused disasters except volcano are covered
- Index such as the possibility of disaster occurrence can be obtained
- The scale of the grid is relatively small (the smallest grid is 1km) and detailed information can be obtained

In addition to “Global Risk Data Platform”, the following database was selected to supplement “Global Risk Data Platform”.

(ii) Socioeconomic Data and Applications center

The database is useful to obtain information on volcanic activities. At the same time, this database can be used for other disasters when “Global Risk Data Platform” does not work properly.

(iii) NOAA National Geophysical Data Center

This database is used to obtain tsunami data when “Global Risk Data Platform” does not work properly.

(iv) Google Maps

“Google Maps” is useful for to obtain topographical or terrain features. Especially for storm surges, terrain condition. If “Google Earth” is available, to obtain elevation data can be easier. Also some data can be easily get with “Google Earth”.

Table 4.2-1 shows useful information sources for screening.

Table 4.2-1 Selection of natural disaster Information sources for using screening

NO	Sources (Abbr.)	Information											Display resolution					Usage	
		Events									Hazards								
		Flood	Tropical cyclone	Storm surge	Landslide	Eathquake	Tsunami	Volcano	Drought	Topography	Past event	Likely frequency	approx.1×1km	approx.5×5km	approx.10×10km	approx.50×50km	approx.100×100km	Evaluation	Remark
1	GRDP	○	○	×	○	○	○	×	○	○	○	○	←			→		◎	Information about almost hazards is avalable. Spatial resolution is high. This is most suitable for screening.
2	SEDAC	○	○	×	○	○	×	○	○	×	○	○		←			→	○	Information about almost hazards is available. For each hazard, risk indicies are available. This supplements "GRDP" as volacano information source for screening.
3	Google Maps	×	×	×	×	×	×	×	×	○	×	×	←				→	○	This is suitable for getting topographycal features. This supplements "GRDP" and "SEDAC".
4	NGDC	×	×	×	×	○	○	○	×	○	○	×	←				→	△	
5	EM-DAT	○	○	×	○	○	×	○	○	×	○	×					↔	△	
6	DesInventar	△	△	△	△	△	△	△	△	×	○	×					↔	△	
7	DFO	○	×	×	×	×	×	×	×	×	○	×					↔	△	A little hazard information available. Display resolution is low. This is not suitabele for screening.
8	NCDC	×	○	×	×	×	×	×	×	×	○	×					↔	△	
9	Global CMT	×	×	×	×	○	×	×	×	×	○	×	←				→	△	
10	CEC	×	×	×	×	○	×	×	×	×	○	×	←				→	△	
11	NMNH	×	×	×	×	×	×	○	×	×	○	×	←				→	△	

【Notes】
Information ○：available △:partially avalable ×：none
Evaluation ◎：High valuable ○：Modedrate valuable △：Low valuable

【Abbrebiations】
GRDP：Global Risk Data Platform
SEDAC：Socioeconomic Data and Applications Center
NGDC：National Geophysical Data Center
EM-DAT：Emergency Events Database
DesInventar：Disaster Information Management System
DFO：Dartmouth Flood Observatory
NCDC：National Climatic Data Center
Global CMT：Global Centroid-Moment-Tensor Project
CEC：Composite Earthquake Catalog
NMNH：National Museum of Natural History

5. Considering Screening and Scoping Processes

5.1 Considering the Nature and Methodology of Screening

5.1.1 Needs Surveys

We considered screening with attention to the idea that thematic department people in charge would essentially conduct screening, and eventually proposed including items for disaster risk reduction consideration on the project survey sheet with the belief that any information from the partner country's government at the needs survey stage should be respected. The following are details from the proposal:

(i) Historical information about natural disasters from the partner country

We request the inclusion of historical information about natural disasters from the partner country's government on the official request.

(ii) Creation of project survey sheet

Include historical information about disasters included on the official request and obtained and understood by the JICA overseas office on the Project Survey Sheet. Table 5.1-1 shows a draft of the survey form.

Table 5.1-1 Project survey sheet (draft)

Project survey sheet (draft)

《Disaster Risk Reduction》

1. Disaster risk about following hazards are described on an Official Request.

☐Flood ☐Tropical cyclone ☐Storm surge ☐Landslide ☐Earthquake

☐Tsunami ☐Volcano ☐Drought(Agricultural Project only)

Comments

2. Disaster Foresight about following hazards are need.

☐Flood ☐Tropical cyclone ☐Storm surge ☐Landslide ☐Earthquake

☐Tsunami ☐Volcano ☐Drought(Agricultural Project only)

Why needs? / History of Disaster

The historical information about disasters included on the Project Survey Sheet must be confirmed during screening. For the types of disasters confirmed, omit the confirmation of natural disaster data in the database and topography and "forethought to disaster risk reduction is necessary."

5.1.2 Screening Methodology

(1) Disaster indicator

Screening is conducted for floods, tropical cyclones, high tides, storm surges, landslides, earthquakes, tsunami, volcanic eruptions and droughts.

As shown on Table 5.1-2, the definitions of disaster indicators (past events, risk (or disaster risk), exposure and hazards) are as follows. It is worth noting that a disaster is explained as a combination of exposure to hazards, vulnerability and lack of sufficient response capacity and countermeasures[38].

Table 5.1-2 The Four Disaster indicators

Disaster indicator	Meaning
Past events	Records generated in the past. Disaster history
Risk (disaster risk)	Risk is generally the combination of event probability and the negative effects of those events. Disaster risk is potential damage to human lives, livelihoods and property due to disasters that could strike a given area in the future.
Exposure	People and property that exist in a place affected by hazards and could suffer damage due to those effects.
Hazards (hazards, disaster-causing events, external forces)	Events, substances, actions and other things that threaten human lives, property and livelihoods. Hazards are expressed quantitatively according to frequency of events at different strengths in individual regions, estimated based on past data and scientific analysis.

Note: Created based on *"2009 UNISDR Terminology on Disaster Risk Reduction"* (UNISDR, 2009). However, this does not include past events.

For the following reasons, the Hazards indicator is the main indicator used during screening for forethought to disaster risk reduction.

There are four indicators for disasters: Past Events, Risk, Exposure and Hazards.

- Past Events: Records of events that occurred in the past
- Risk: Combination of event probability and negative effects of those events
- Exposure: People, assets and other things that could be affected by hazards
- Hazards (events caused by disasters, external forces): Events, substances, actions and other things that threaten human lives, assets and livelihoods. Hazards are expressed quantitatively according to frequency of events at different strengths in individual regions, estimated based on past data and scientific analysis.

(2) Natural Disaster Data

We selected a natural disaster database from sources of information about natural disasters, focusing on minimizing oversight of disaster information and using categories that are easy to understand. We determined types of disasters that warrant considerations with the Global Risk Data Platform (GRDP) and NASA Socioeconomic Data and Application Center (SEDAC) serving as the main reference databases. We also set up a backup database of SEDAC and

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38 UNISDR(2009) *"2009 UNISDR Terminology on Disaster Risk Reduction"*

NOAA NGDC for times when we cannot access the main databases.

Global Risk Data Platform (GRDP)

http://preview.grid.unep.ch/index.php?preview=home&lang=eng

NASA Socioeconomic Data and Application Center (SEDAC)

http://sedac.ciesin.columbia.edu/

NOAA National Geophysical Data Center Website

https://www.ngdc.noaa.gov/hazard/tsu.shtml

The GRDP and NASA SEDAC are worldwide GIS disaster risk databases publicly available on the Internet. The GRDP can be used to obtain information about the four disaster indicators (past events, risk, exposure and hazards) from anywhere in the world; the NASA SEDAC can be used to obtain information about the hazards and risk indicators. Information can be gathered in areas as small as 1km×1km to 200km×200km, depending on the type of disaster.

We selected data (Tables 5.1-3 and 5.1-4) by disaster since the database compiles information about multiple hazards for each type of disaster. Table 5.1-4 is the reference data for backup in case we cannot access the data shown on Table 5.1-3. In addition, explanations of the data selected are shown on Table 5.1-5 and in (i) through (vii) below. Note that we did not evaluate the hazards indicators for storm surges because we could not find a database for properly confirming them.

Table 5.1-3 Hazard data for reference during screening
（when Global Risk Data Platform is accessible）

Disaster type	Dataset and Database		Display resolution
Flood	Hazards/Flood Frequency（100）	GRDP	Approx. 1km
Tropical Cyclone	Hazards/Frequency		Approx. 2km
Landslide	Hazards/Landslides PR		Approx. 1km
Earthquake	Hazards/Earthquakes MMI		Approx. 10km
Tsunami	Hazards/Tsunami		Approx. 1km
Volcano	Volcano Hazard Frequency and Distribution	SEDAC	Approx. 50km
Drought	Past Events/Drought events	GRDP	Approx. 50km

Table 5.1-4 Hazard data for reference during screening
(when Global Risk Data Platform is inaccessible)

Disaster type	Dataset and Database		Display resolution
Flood	Hazard Frequency and Distribution	SEDAC	Approx. 100km
Tropical Cyclone	Cyclone Hazard Frequency and Distribution		Approx. 5km
Landslide	Landslide Hazard Distribution		Approx. 5km
Earthquake	Earthquake Frequency and Distribution		Approx. 50km
Tsunami	Tsunami Event	NOAA NGDC	Dot display
Volcano	Volcano Hazard Frequency and Distribution	SEDAC	Approx. 50km
Drought	Drought Hazard Frequency and Distribution		Approx. 200km

Hazard information for reference during screening on GRDP and SEDAC is shown in Table 5.1-5. And each of natural hazards are explained in next sections.

Table 5.1-5: Hazard information for reference during screening

Disaster type	Reference data	Indicator	Database	Summary
Flood	Flood Frequency(100)	Hazard	GRDP	Frequency of major flood is 1event/100years or more.
	Hazard Frequency and Distribution	Hazard	SEDAC	Frequency of major flood.
Tropical Cyclone	Hazards/Frequency	Hazard	GRDP	Frequency of Saffir-Simpson Hurricane Wind Scale 5 level is 0.25 occurrences / year or more.
	Cyclone Hazard Frequency and Distribution	Hazard	SEDAC	Frequency of the occurrence of rainstorms.
Landslide	Hazards/ Landslides PR	Hazard	GRDP	Frequency of the occurrence of landslide caused by precipitation.
	Landslide Hazard Distribution	Hazard	SEDAC	ditto
Earthquake	Hazards/ Earthquakes MMI	Hazard	GRDP	Seismic intensity MMI 5 or more that occurs at the probability of 10% in 50 years
	Earthquake Frequency and Distribution	Hazard	SEDAC	Frequency of earthquake occurrence estimated with earthquake which Richter scale was more than 4.5 for past 26years.
Tsunami	Hazards /Tsunami	Hazard	GRDP	Distribution of tsunami caused by earthquake which probability of occurrence in 500years.
	Tsunami Event Tsunami Observation	Past event	NOAA NGDC	Records of tsunami occurrence.
Volcano	Volcano Hazard Frequency and Distribution	Hazard	SEDAC	Distribution of Volcano which VEI is 2 or more.
Drought	Past Events/ Drought events	Past event	GRDP	Records of drought occurrence.

	Drought Hazard Frequency and Distribution	Hazard	SEDAC	Frequency of drought occurrence.

Source: Websites of GRDP, SEDAC and NGDC NOAA

(i) Floods

Hazards and flood frequency (100) compiled on the GRDP are used to evaluate hazards indicators related to floods. This data indicates the distribution of frequencies of floods per 100 years estimated from flood history and the flood distribution model by Herold and Mouton (2011)[39] based on global runoff analysis. The data is separated into three classifications within 1-km grid cells: one- to five-year events, five- to 50-year events, and 50-year and above events.

Figure 5.1-1 is a comparison between the distribution of flood events predicted by the flood hazard distribution created by UNISDR's GRDP in 2011, and the distribution of floodwater during an actual flood that occurred in Pakistan in August 2010. The flood model predicted that the area that flooded in Pakistan in August 2010 would experience flood events one to five times in 100 years, or five to 50 times in 100 years. The flood model produced the same results as actual flood distribution in many locations (locations where floods occur 5 to 50 times in 100 years), but differed from actual flooding in locations where floods do not occur frequently and thus where the model did not predict floods. Thus, in screening we rely not only on verifying hazards indicators but also confirm topography. It is important to gather sufficient information on local conditions and the like to the extent possible.

SEDAC (the alternative to GRDP) predicts the frequency of flooding in 2.5-degree (roughly 5-km) grid cells. The data is based on the list of major floods that occurred from 1985 to 2003 compiled by Canada's Dartmouth Flood Observatory. Note that there is insufficient data for the 1990s. The information online is displayed in grid cells roughly 100 km on each side, and shows that floods occur more frequently as the cell dimensions increase.

[39] Herold, C. and Mouton, F. (2011): "*Global flood hazard mapping using statistical peak flow estimates*", Hydrol. Earth Syst. Sci. Discuss., 8, 305–363, Digital Object Identifier: 10.5194/hessd-8-305-2011.

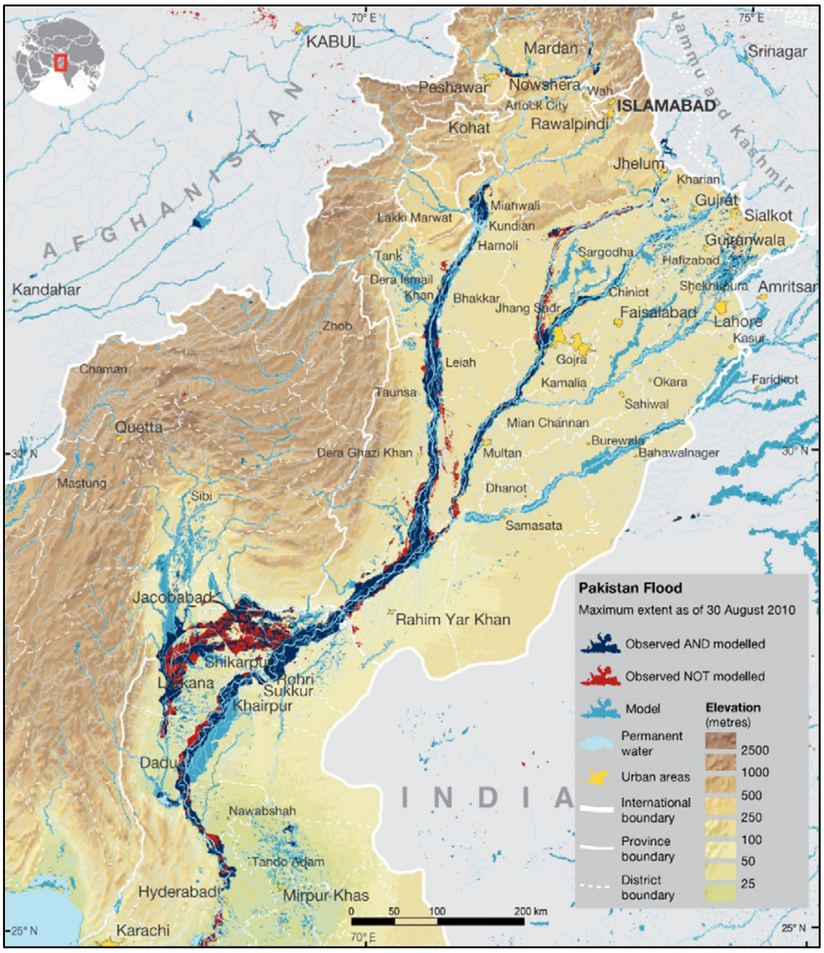


Figure 5.1-1 Global Risk Data Platform Flood Model vs An Actual Major Flood

Note: The model was compared to the flooding that occurred in Pakistan in August 2010 (1,700 deaths, damage of USD 9.7 billion)

Source: UNISDR(2011) "*Global Assessment Report on Disaster Risk Reduction*" United Nations International Strategy for Disaster Reduction Geneva.

(ii) Tropical cyclone

"Hazards/ Frequency" compiled on the GRDP are used to identify the hazard of tropic cyclone. This index shows the distribution of tropical cyclones with Saffir-Simpson Hurricane Wind Scale of 5 estimated from modified Holland's model[40] taking into consideration the migration of tropical cyclones based on the data for tropical cyclones generated in 1969-2009.This index is classified into 5 levels by approximately 2km grid, which are less than 0.25 events/year, 0.25-0.50events/year, 0.50-0.75events/year, 0.75-1.00events/year, and 1.00-1.24events/year.

[40] Holland, G. J. (1980): "An analytic model of the wind and pressure profiles in hurricanes". Monthly Weather Review, 108, 1212-1218.

Table 5.1-6 shows the Saffir-Simpson Hurricane Wind Scale according to NOAA[41].

A tropical cyclone that registers as a 5 on the Saffir-Simpson scale causes destructive damage (damages houses, etc.). However, smaller tropical cyclones can cause major damage depending on the conditions at each location, and smaller-scale disasters naturally occur very frequently. Thus, even at a frequency of 0.25 times per year, it is difficult to say that the impact is small. Therefore, considerations are necessary for all levels of disaster that can be confirmed on GRDP.

Table 5.1-6 Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 km/h	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 km/h or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: http://www.nhc.noaa.gov/aboutsshws.php

The SEDAC tropical cyclone hazards indicator was created from the data which Past events/Tropical cyclone tracks on GRDP was also based on. The indicator is split into 2.5-degree (roughly 5-km) grid cells, and the data is based on the tracks of more than 1,600 storm events on

[41] http://www.nhc.noaa.gov/aboutsshws.php

the Pacific, Atlantic and Indian Oceans between 1980 and 2000. The data shows that storm events occur more frequently as the cell dimensions increase.

(iii) Landslides

"Hazards/ Landslide PR" compiled on the GRDP are used to identify the hazard of landslide. This index shows the distribution of annual frequency estimated from multivariate analysis using the response variable of landslide occurring mainly in Europe and the 6 predictor variables of slope, geology, soil moisture, vegetation, precipitation and earthquakes.

This index is classified into 4 levels by each approximately 2km grid, which are Low, Medium, High, and Very High.

Landslide terrain and its development according to Watari and Kobashi (1987) are shown in Figure 4-3. Landslides characteristically show recurrence and reactivation, and occur in a peculiar terrain (landslide terrain) consisting of a scarp and a sliding mass.

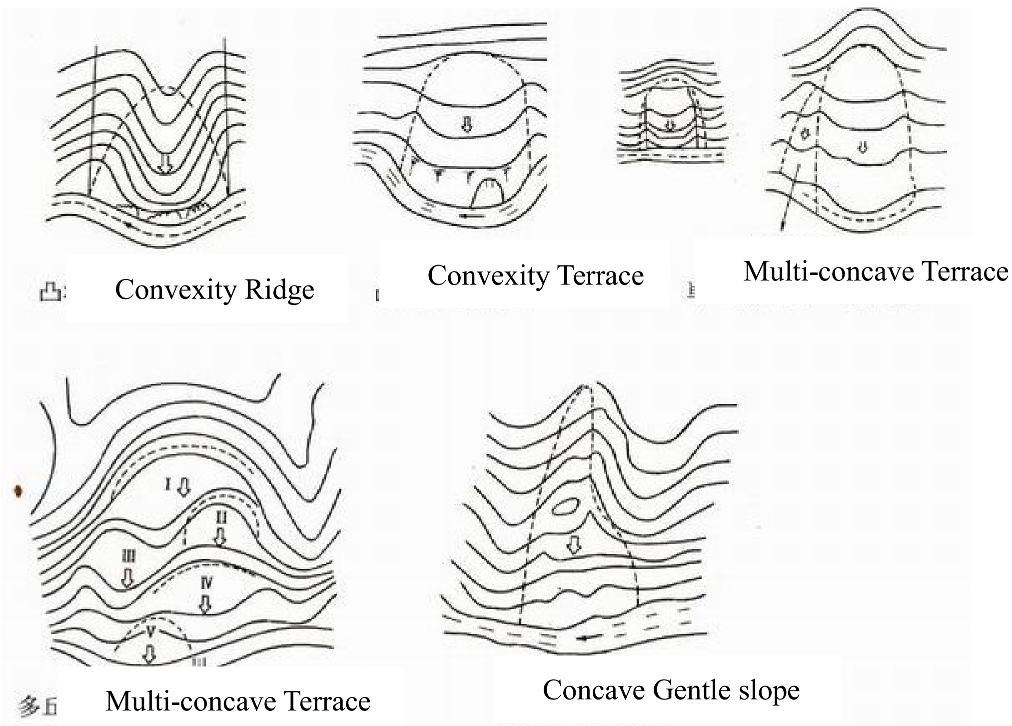


Figure 5.1-2 Landslide types depend on Topography and its developing process

Source: Watari, Masasuke and Kobayashi, Sumizi (1987) "*Prediction and mitigation of landslide-slope disaster*" Sankaido Publishers, Tokyo.

The SEDAC landslide hazards indicator is based on hazard distribution maps of landslides and avalanches prepared by the Norwegian Geotechnical Institute, and the frequency of landslides is predicted for 2.5-degree (roughly 5-km) grid cells based on slope, soil, soil moisture, precipitation, seismic activity and temperature data. There are six frequency levels: Low, Low to Moderate, Moderate Medium, Medium to High, High and Very High.

(iv) Earthquakes

"Hazards/ Earthquakes MMI" compiled on the GRDP are used to identify the hazard of earthquake. This index shows the distribution of earthquakes classified by the Modified Mercalli Intensity[42] [43](see Table 5.1-7) expected to occur at the probability of 10% in 50 years, estimated from the simulation of maximal acceleration and velocity amplitude using the parameters of the distance from epicenter, crustal structure, and rock/soil geology.

This index is classified into 4 levels by approximately 10km grid, which are 5-7, 7-8, 8-9, and 9 or more in 50years.

The Modified Mercalli Intensity Scale is an intensity of shaking used in the United States and many other non-Japanese countries, and damage caused by past earthquakes is used to classify and indicate the extent of damage for each level. It is difficult to precisely compare Modified Mercalli Intensity to seismic intensity on the seismic intensity scale used by the Japan Meteorological Agency (JMA) because the Japanese uses a seismic intensity meter, and because damage differs depending on building type and other factors. Roughly speaking, an earthquake that registers as a V on the Modified Mercalli Intensity scale corresponds to a 4 on the JMA seismic intensity scale; a VI is a weak 5, a VII is a strong 5, an VIII is a weak 6, a IX is a strong 6 to a 7, and a X is a 7.

Table 5.1-7 Modified Mercalli Intensity Scale

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very	Damage negligible in buildings of good design and construction; slight

[42] Wood, H. O. and Neumann, F. (1931): "*Modified Mercalli intensity scale of 1931*", in "Bulletin of the Seismological Society of America (Seismological Society of America) "Vol.21: p277–283.

[43] Richter, C. F (1958): "*Elementary seismology*", Freeman Co., San Francisco, 768 pp.

	strong	to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Extreme	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Extreme	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source:

1) Wong, I., Silvia, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li, S., Mabey, M., Sojourner, A., and Wang, Y. (2000) "*Earthquake Scenario and Probabilistic Ground Shaking Maps for the Portland, Oregon, Metropolitan Area*" state of Oregon Department of geology and mineral industries, Portland.
2) USGS http://earthquake.usgs.gov/learn/topics/mag_vs_int.php

The SEDAC earthquake hazards indicator was created from earthquake catalog data from the Advanced National Seismic System (ANSS), which is operated by the United States Geological Survey (USGS). The catalog contains the distribution of earthquakes registering higher than 4.5 on the Richter scale between 1976 and 2002. The information was compiled in 2.5-degree (roughly 5-km) grid cells but is shown online in roughly 50-km cells, and shows that earthquakes occur more frequently as the cell dimensions increase.

(v) Tsunami

"Hazards/ Tsunami Hazard" compiled on the GRDP are used to identify the hazard of Tsunami. This index shows the distribution of the 500-year probability of tsunami caused by an earthquake estimated from the hazard maps based on existing literature data on tsunami and the numerical model analysis in several areas.

This index is classified into 5 levels by approximately 1km grid, which are less than 0.2, 0.2-0.4, 0.4-0.6, 0.6-0.8, and 0.8-1.0 in 500yers.

The hazards of tsunamis caused by landslides, rock falls, and volcanic eruption are not included.

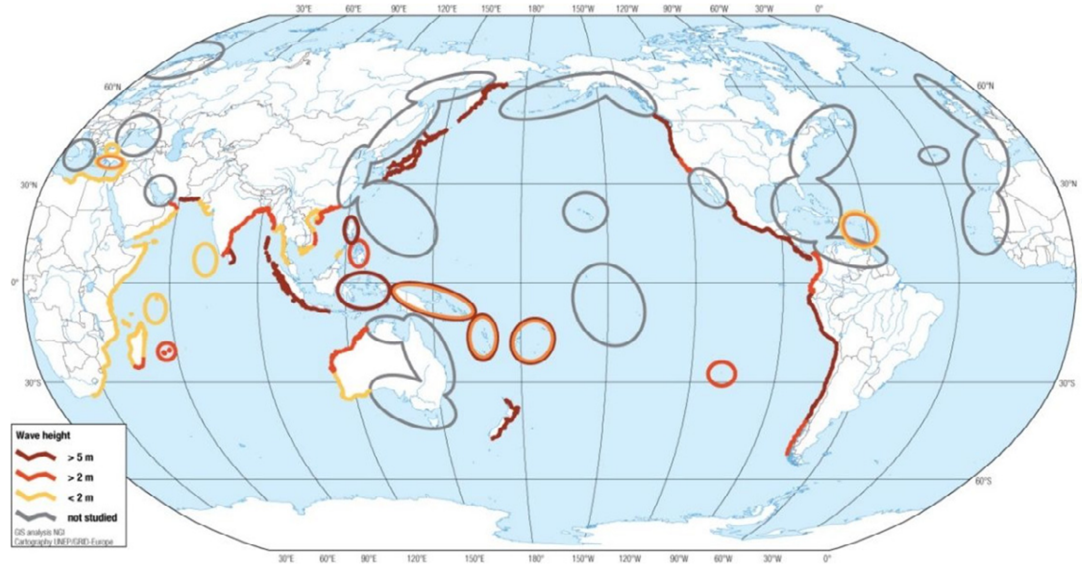


Figure 5.1-3 Distribution of tsunami hazard.

Note: Tsunami hazard data compiled on "Global Risk Data Platform" are based on this source.

Source: UNISDR(2009） "*Global Assessment Report on Disaster Risk Reduction*". United Nations, Geneva.

(vi) Volcano

"Global Volcanic Hazard Frequency and Distribution Volcano hazard" compiled on the SEDAC are used to identify hazard of volcanos.

The source is the volcano database of NOAA NGDC. Of the volcanic eruptions that occurred in 1979-2000, the number of those with the Volcanic Explosivity Index[44] of 2 to 8 as calculated for each 2.5' (approx. 5-km) grid cell is compiled in a 50k-m grid and classified into 4 levels, which are 1-10, 11-30, 31-60, and 61-130.

The schematic diagram of the Volcanic Explosivity Index according to USGS[45] is shown in Figure 5.1-4. An eruption with the Volcanic Explosivity Index of less than 2 is "small scale" or "with no recognizable volcanic ejecta." The level of hazard used in screening is considered to provide a relative indicator of the distribution of volcanic hazards that are large enough to cause damage. However, because volcanoes with no past records of eruption can still cause eruption, attention must always be paid to volcanic hazards on and around a volcano.

[44] Newhall, C.G., and Self, S. (1982): "*The volcanic explosivity index (VEI): An estimate of explosive magnitude for historical volcanism*" in "Journal of Geophysical Research" Vol.87, p.1231-1238.

[45] U.S. Geological Survey: VHP Photo Glossary: VEI. http://volcanoes.usgs.gov/images/pglossary/vei.php

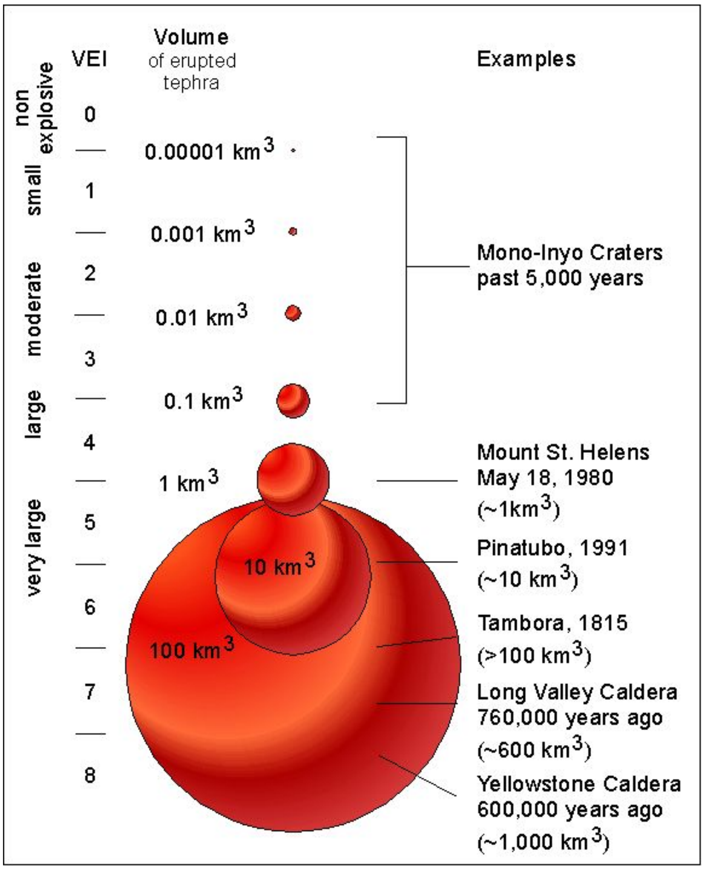


Figure5.1-4 Schematic model of Volcanic Explosivity Index

Source: USGS website http://volcanoes.usgs.gov/images/pglossary/vei.php

(vii) Drought

Past events and drought events compiled on the GRDP are used to assess the hazard levels of droughts. This indicator uses the Standardized Precipitation Index[46], a data set of monthly rainfall in squares of a nearly 50-km grid throughout the world, to predict whether or not a drought will occur.

The SEDAC drought hazards indicator applies the Weighted Anomaly of Standardized Precipitation (WASP), which is an indicator of abnormal precipitation developed by the International Research Institute for Climate and Society (IRI) at Columbia University in the United States of America. A drought is defined as a period of three consecutive months or longer where monthly rainfall is less than 50% of the median monthly rainfall for the 21 years between 1980 and 2000. The results displayed were calculated in 2.5-degree grid cells. Droughts occur more frequently as the cell dimensions increase. The grid cells online are roughly 200 km on each side.

[46] Mckee, T.B., Doesken, N.J., and Kleist J. (1993): “*The relationship of drought frequency and duration to time scales*”. Proceedings of the 8th Conference on Applied Climatology, p.179-184, Anaheim, CA.

(3) Screening Methodology (Assessing the Need for Forethought to disaster risk reduction)

As explained previously, hazards indicators are confirmed in order to identify disasters that require forethought to disaster risk reduction. However, floods, landslides and tsunami cannot be evaluated through hazards indicators alone, and we are unable to obtain hazard information for storm surges. Thus, we have decided to refer to topography. Droughts were only considered for agricultural projects; thus, droughts are not considered for other projects. Figures 5.1-5 through 5.1-8 show the evaluation procedures used in the evaluation through hazards indicators and evaluation through topography proposed here.

(i) Evaluation through hazards indicators

The hazards used during screening have been converted into indicators of disaster risk based on characteristics of each area. As a rule, areas in which a Hazards indicator has been confirmed will be assessed as "requiring forethought to disaster risk reduction," **regardless of the scale of the hazard.**

In addition, a hazard may appear on different levels of the GRDP and other databases, but the area will be assessed as "requiring forethought to disaster risk reduction" no matter which level. It is worth noting that backup databases have been selected for the databases viewable online, since it has been verified that they are not always accessible. Tables 5.1-3 and 5.1-4 show these backup databases.

(ii) Evaluation through geography

Topography sometimes prevents floods, landslides, storm surges and tsunami from occurring. Thus, the following topographical information should be referenced. Storm surges will be assessed based on topography only; it is difficult to assess whether or not they will occur (other than as part of tropical cyclones) because it is not possible to obtain hazard reference data for them.

- Floods: Major river deltas. Alongside rivers.
- Landslides: Slopes in mountainous and hilly areas and its adjacent areas.
- Tsunami: Coastline areas at elevations 35 meters or lower (at elevation 35m rarely experience tsunami).
- Storm surges: Coastline areas at elevations 10 meters or lower (at elevation 10m the tide level is extremely unlikely to reach).

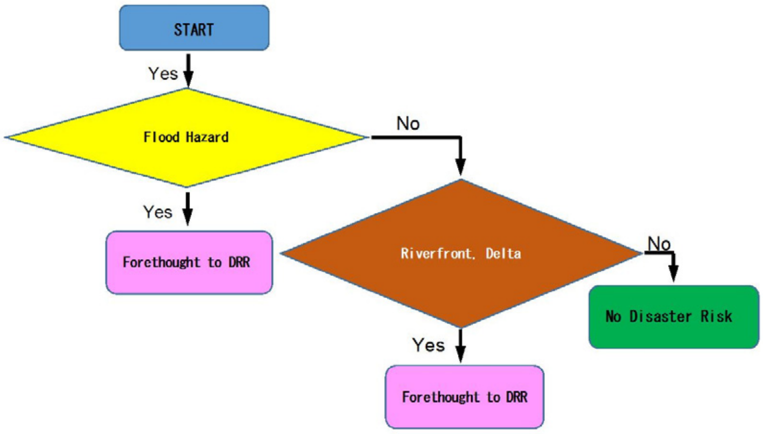
As explained above, Hazard indicators, topopgraphy and details about each concern will be used during screening to determine the need for forethought to disaster risk reduction.

(a) Judge the necessity of disaster forethoughts using **hazards** as the primary input and **topography** as the secondary input.

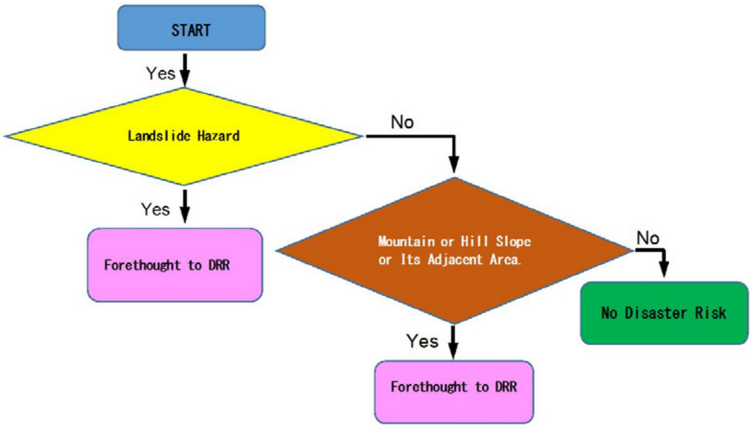
: Although the possibility of a disaster can be estimated from topography, accurate judgment is difficult.

⇒ Floods, landslides, tsunami

Flood



Landslide



Tsunami

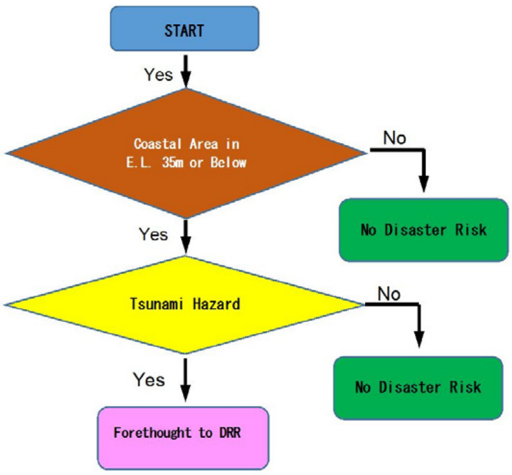


Figure 5.1-5 Procedure of screening with hazard and topography data(flood, landslide and tsunami).

Note: Hazards and topography must be examined in the evaluation of floods using SEDAC

(b) Judge the necessity of disaster forethoughts using **hazards** as the primary input.

：It is difficult to estimate the possibility of a disaster from topography.

⇒ Tropical cyclones, earthquakes, volcanoes

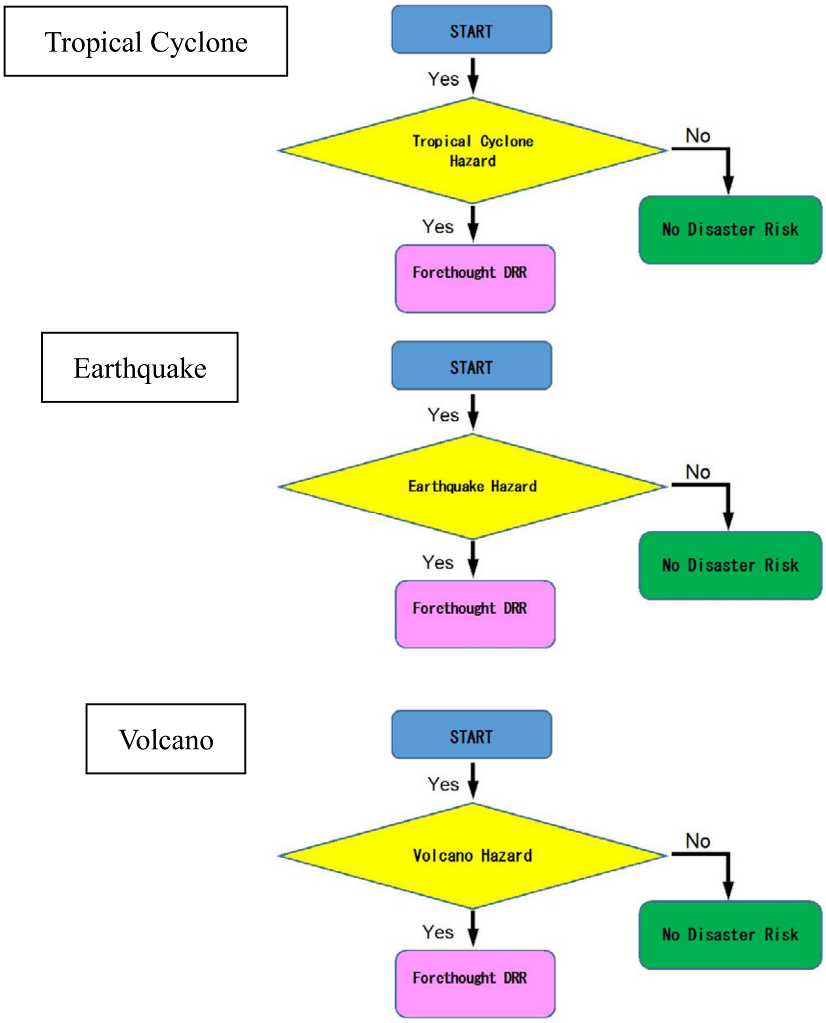


Figure 5.1-6 Procedure of screening with hazard and topography data (tropical cyclone, earthquake and volcano).

(c) Judge the necessity of disaster forethoughts using **topography** as the primary input.

：The possibility of a disaster can be estimated from topography.

⇒ Storm surges

Storm Surge

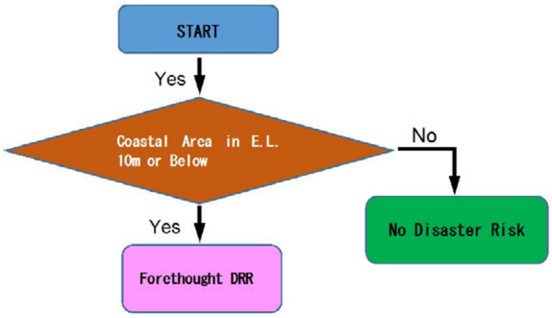


Figure 5.1-7 Procedure of screening with hazard and topography data (storm surge).

(d) Judge the necessity of disaster forethoughts using **the nature of project** as the primary input and **hazards** as the secondary input.

：Necessity can be judged from the nature of project. It is difficult to estimate the possibility of a disaster from topography.

⇒ Droughts

Drought

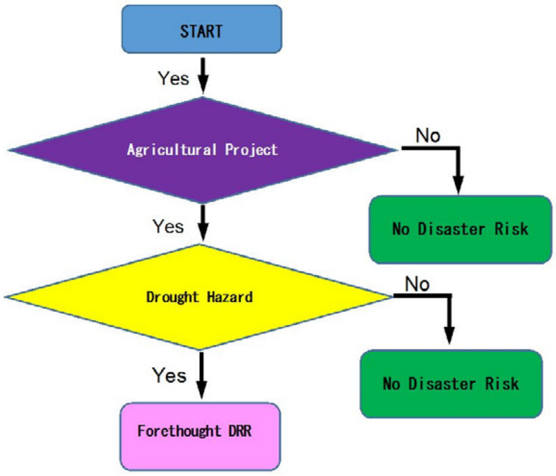


Figure 5.1-8 Procedure of screening with hazard and topography data (drought).

5.2 Considering Scoping Items

5.2.1 Methodology for Considering Scoping Items

This study must fully grasp the risk of natural disasters to (1) avoid projects from natural disasters, (2) add the capacity to respond to natural disasters in project, and (3) enhance local disaster risk reduction capacity. Thus, the following items must be studied.

- Disaster history verification (Studies can result in the conclusion that no response is necessary)
- Studies that fully grasp the state of disaster response (facility maintenance, drafting of relevant plans, establishment of relevant legislation, etc.) (Studies can result in the conclusion that no response is necessary)
- Structural measures: Strengthening facilities planned by projects against expected disasters.
- Non-structural measures: Drafting evacuation plans, creating hazard maps and other organizational measures
- Education and enhancement of community disaster risk reduction as part of technical cooperation to increase awareness of disaster risk reduction in partner countries.
- The possibility of the occurrence of new accidents due to the developed

Next, we followed the procedures below to confirm the content of development projects implemented by JICA as well as the status and possibility of implementation for the forethought to disaster risk reduction described above, and create scoping lists.

(i)To gain a full understanding of what kinds of measures and studies for disaster risk reduction JICA is implementing, we gathered existing terms of reference from disaster risk reduction projects and verified their content.

(ii)We obtained the following information after gathering existing terms of reference for individual sectors and types of assistance for projects other than those for disaster risk reduction and interviewing each thematic department.

・Verify the content of the work for types of assistance in each sector

・Implementation status of forethought to disaster risk reduction for each

・ Imaginable forethought to disaster risk reduction, etc. for each not currently being implemented

(iii)We used this obtained information to organize items to study for each sector and type of assistance for each type of disaster.

(iv)We reorganized these study items into scoping lists comprising common items and items that can be integrated between sectors and types of assistance.

Figure 5.2-1 shows study process for creating scoping lists.

Study JICA disaster risk reduction matters and forethought to disaster risk reduction concerns

Gather information through work instructions and reports

↓

Study work outside JICA disaster risk reduction matters

Implementation status of forethought to disaster risk reduction outside JICA disaster risk reduction matters

↓

Interview JICA involved department (See Chapter 3.1)

↓

Selecting study items for forethought to disaster risk reduction

・Study items for commonly accepted forethought to disaster risk reduction

・Study items for forethought to disaster risk reduction being implemented

・Study items for imaginable forethought to disaster risk reduction

・Target study items for all sectors, types of assistance

↓

Organizing study items for forethought to disaster risk reduction

・Integrating study items common to multiple sectors and types of assistance

↓

Prepare a draft of the scoping list

Figure 5.2-1 Study Process for Creating Scoping Lists

5.2.2 Creating Scoping Lists

The type of cooperation determines JICA project work processes, and the timing and nature of scoping. In addition, study content within the type of cooperation differs depending on the stage. Therefore, scoping lists will be classified according to type of cooperation: in technical cooperation projects, A or A' depending on whether or not construction is involved; and in grant aid projects, B or C depending on the stage. Specific information required for disaster risk reduction for A and A' lists is gathered during the main study for technical cooperation projects, and thus the same study content from all sectors can easily cover it. B list study content is not separated into sectors as it is gathered prior to preparatory studies (C); thus, there is no problem with simply using the same study content from all sectors. Detailed information is required for preparatory studies, and study content differs depending on project content, thus scoping lists were prepared for each sector. They were organized as follows. Table 5.2-1 is a description of scoping lists.

Scoping A: For creating terms of reference for detail planning survey technical cooperation
Scoping A lists show items related to forethought to disaster risk reduction to verify and consider during detail planning survey for technical cooperation that does not involve construction (e.g. technical cooperation projects, technical cooperation for development planning). These lists will facilitate full understanding of the risk of disasters that could impact technical cooperation projects, and consideration of whether or not to add new efforts (non-structural measures, etc.) to reduce the risk of natural disaster damage on organizations and activities under those projects in order to build communities that are more resilient in the face of those disasters.

Scoping A': For creating instructions for the above studies that involve construction
Scoping A' lists show items related to forethought to disaster risk reduction to verify and consider during detail planning survey for technical cooperation that involves construction (e.g. technical cooperation projects, technical cooperation for development planning). These lists will facilitate the consideration of negative impacts that natural disasters could be expected to bring upon (public) services, activities and technology to be transferred at target sites of technical cooperation projects, and of whether or not efforts to mitigate those impacts could be incorporated into those projects. The lists also need to facilitate the consideration of whether or not to add new efforts (non-structural measures, etc.) to reduce the risk of natural disaster damage on organizations and activities under those projects in order to build communities that are

more resilient in the face of those disasters.

Scoping B: For work instructions in preparatory (preliminary) studies for grant aid or loan assitance
Scoping B lists show items related to forethought to disaster risk reduction to verify and consider during preliminary studies for grant aid. Those studies will verify disaster history and disaster risk reduction facilities in plan areas in advance of preparatory studies, and consider the need for forethought to disaster risk reduction in preparatory studies, as well as items and the extent of the considerations. The lists also need to facilitate the consideration of whether or not to add new efforts (non-structural measures, etc.) to reduce the risk of natural disaster damage on organizations and activities under those projects in order to build communities that are more resilient in the face of those disasters.

Scoping C: For creating work instructions for preparatory studies for grant aid or loan assitance
Scoping C lists show items related to forethought to disaster risk reduction to study, verify and consider during preparatory studies for grant aid. During preparatory studies, the negative impacts that natural disasters could be expected to bring upon buildings to be constructed under the project will be considered, as well as whether or not efforts to alleviate those impacts could be incorporated into those projects. The lists also need to facilitate the consideration of whether or not to add new efforts (non-structural measures, etc.) to reduce the risk of natural disaster damage on organizations and activities under those projects in order to build communities that are more resilient in the face of those disasters.

Table 5.2-1 Scoping Lists

Type	Coverage			
Scoping List A	Technical cooperation projects	All sectors	Project without construction work	Detail planning survey
Scoping List A'	Technical cooperation projects	All sectors	Project with construction work	Detail planning survey related construction work, such as technical cooperation for development planning
Scoping List B	Grant aid	All sectors	Preliminary survey	Preliminary survey for preparatory study
Scoping List C	Grant aid	Urban / regional development Private sector development	Industrial park	Preparatory study in grant aid and loan assistance
		Transportation	Air port	
			Harbor and port	
			Road	
			Rail way	
			Bridge	
		Natural resource and energy	Supply of electric power	
			Electric power plant	
		Education	School	
		Health	Hospital	
		Environmental management	Waste water treatment plant	
			Sewer pipe network	
			Waste disposal facility	
		Water resources / Disaster management	Water purification plant	
			Water pipe network	
		Agricultural / rural development	Irrigation	
		Fishery	Fishery facility	
		Natural resource and energy Water resources / Disaster management Agricultural / rural development	Dam Reservoir	

6. Trial Screening and Scoping through Pilot Experiments

JICA's thematic departments implemented trial screening and scoping to improve screening sheets, scoping list and the relevance of screening and scoping.

6.1 Pilot Experiment Selection and Verification Details

6.1.1 Selecting Pilot Projects

We used the following guidelines to select pilot projects (Figure 6.1-1). First, thematic departments recommended typical projects and provided its terms of reference, publicized documents and other information. Terms of reference and other documents that could not be obtained were supplemented with JICA's website for procurement.

We used the above information to select 13 projects (Table 6.1-1).

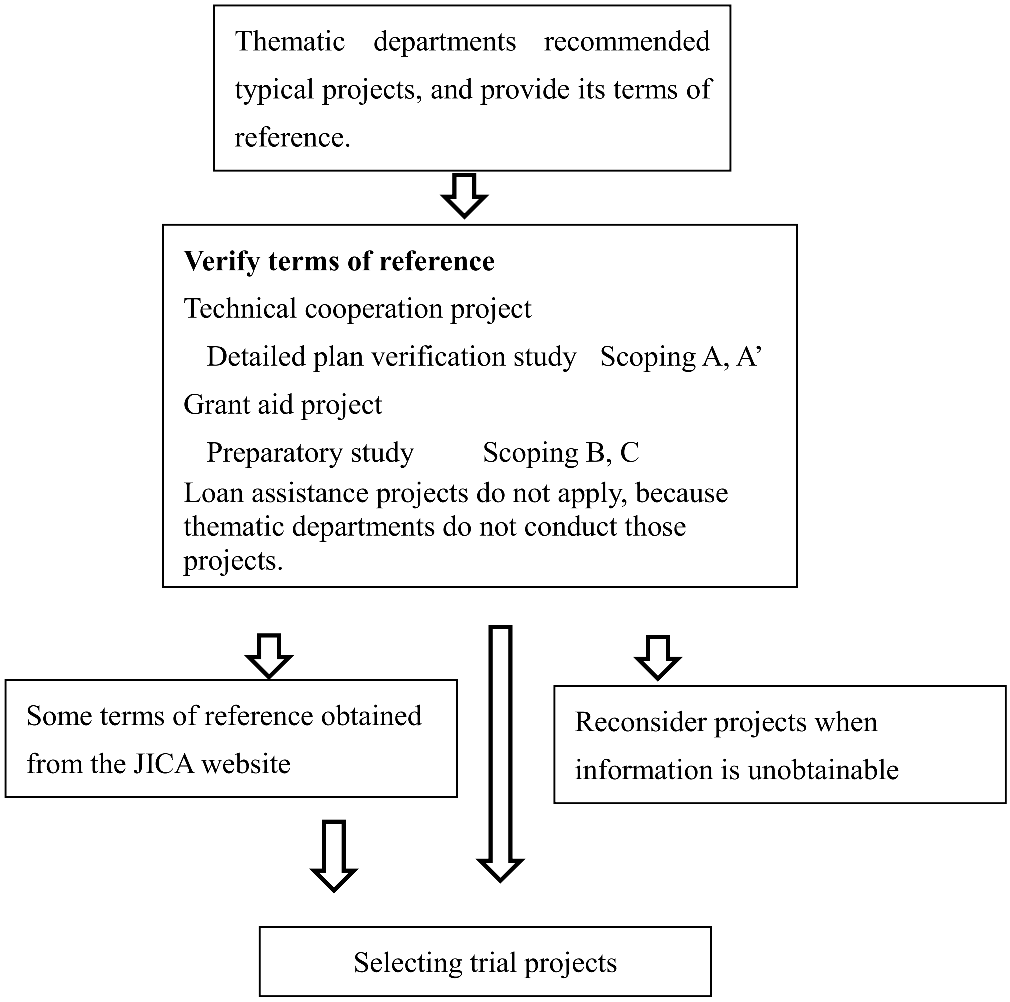


Figure 6.1-1 Procedure for selecting pilot experiment

Table 6.1-1 Selected projects for pilot experiment

Title of project	Sector	Subsector	Scoping list	Type of aid	Schemeof project
Preparatory Survey on the Development of the Dakar Metropolitan Area, Senegar	Urban / Regional Development	Urban planning	A'	Technical cooperation for development planning	Information Collection and Confirmation Study
Mombasa Special Economic Zone Development Master Plan Project in Kenya	Urban / Regional Development	Industrial park	A'	Technical cooperation for development planning	Detail planning survey
Provision of Apia harbor renovation plan Preparatory Survey for the safety improvement in Samoa	Transportation	Port and horbor	C	Grant aid	Preparatory study
The Project for Flood Disaster Rehabilitation and Mitigation in Cambodia	Transportation	Road	C	Grant aid	Preparatory study
Phone Bridge Feasibility Study Preparation in Laos	Transportation	Bridge	C	Grant aid	Preparatory study
National Electric Power System Master Plan and Update Support Project in Tanzania	Natural Resources and Energy	Electric power distribution	A'	Technical cooperation for development planning	Implementation of technical cooperation
Mandalay City Waterworks Emergency Readiness Survey for Private Practice in Myanmar	Water Resources and Disaster Management	Urban water supply	C	Grant aid	Preparatory study
Preparatory Study on Environmentally Sustainable Urban Waste Management Improvements in Laos	Environmental Management	Solid waste management	C	Grant aid	Preparatory study
Preparatory Survey on the Jacmel County Hospital Development in Haiti	Health	Hospital	C	Grant aid	Preparatory study
Asia-Pacific Development Center on Disability (APCD) Project, Phase 2	Social Security	Social welfare facility	A	Technical cooperation	Preparatory study
Improving the Irrigated Rice Production Area in Shokue, Mozambique Project	Agricultural/Rural Development	Agricultural development	A	Technical cooperation	Preparatory study
Promoting High-value Agriculture along the Sindhuli Road Project in Nepal	Agricultural/Rural Development	Agricultural development	A	Technical cooperation	Preparatory study
Fisheries sector master plan project for sustainable fishery in Maldives	Fisheries	Fisheries development	A	Technical cooperation for development planning	Preparatory study

We considered the five points below in selecting experiments.

(i) Every effort was made to include projects from as many sectors as possible.

We made sure that there were no inconsistencies or discrepancies between sectors by making the screening sheet and Scoping Lists A, A' and B the same across all sectors, and created Scoping List C for each sector.

(ii) Projects covered by Scoping A, A', B and C

We performed trials for all scoping since we created four types of scoping lists (A, A', B and C).

(iii) For construction projects, we included planar, linear and location development projects

For Scoping C, we classified further and created scoping lists for each sector to confirm whether scoping lists could stand up to use.

(iv) We included development projects for wide areas (for multiple cities/regions or on a national level)

The objects of screening depend on the size of project target areas; hazard and topography screening require different amounts of time if the area is large, and larger areas have a greater influence on the accuracy of the screening.

(v) Included various areas.

Time required for screening depends on the degree to which an area suffers disasters (some suffer many while others suffer few).

We used these five points to compare the 13 trials selected and arrived at the following results.

(a) As many sectors as possible

We excluded from consideration the cross-cutting sectors, such as peacebuilding, gender equality, support for reconstruction, climate change, poverty reduction, as well as governance and economic policy, which mostly comprise cases for which forethought to disaster risk reduction are unnecessary.

Target sectors: Urban and regional planning, transportation, water resources, natural resources and energy, environmental management, health, social security, agriculture, fishery

Excluded sectors: Information and communications technology, education, natural environment conservation

(b) Projects covered by Scoping A, A', B and C

This includes grant aid, technical cooperation and technical cooperation for development planning, and mainly targeted detail planning survey, and preparatory studies. But no projects were subject to Scoping B.

Scoping A: 4 projects Scoping A': 3 projects Scoping B: 0 projects Scoping C: 6 projects Total: 13 projects

(c) Planar, linear and location development projects

Planar development (industrial parks, ports and harbors)

Linear development (roads, water supply)

Location development (bridges, hospitals, facilities for waste management)

(d) Development projects for wide areas (for multiple cities/regions or on a national level)

Urban development master plan, energy transmission and distribution master plan

(e) Various areas

Southeast Asia (Cambodia, Thailand, Myanmar, Laos)

South Asia (Nepal, the Maldives)

Africa (Mozambique, Senegal, Tanzania, Kenya)

Oceania (Samoa)

Central America/Caribbean (Haiti)

6.1.2 Verifying Screening and Scoping through Trials

(1) Screening

Screening trials were carried out by filling out screening sheets according to work procedures to determine the need for forethought to disaster risk reduction.

We assume that screening is work done to select types of disasters that warrant forethought to disaster risk reduction, implemented correctly and within a short time period by JICA employees not directly involved in disaster risk reduction. Therefore, the following trials were performed for the purpose of verifying the following items:

- Time required for screening
- Areas in screening work where mistakes are likely
- Areas in screening where discrimination is difficult
- Searches of natural disaster and topographical information to form the basis for screening
- Accuracy of screening when conducted over large areas

(2) Scoping

Scoping is the work of selecting the studies required for studies of detailed plan drafts, and preparatory studies. In other words, it is the work of preparing terms of reference for these studies.

In scoping trials, we used scoping lists to consider whether or not to include terms of reference for forethought to disaster risk reduction within terms of reference for target projects that involve types of disasters determined through evaluations during screening to require forethought to disaster risk reduction, and actually included studies required for forethought to disaster risk reduction on existing terms of reference.

- Relevance of scoping classifications A through C
- Relevance of Scoping A, A' and B covering all sectors
- Appropriate amount of items on scoping lists
- Use of scoping lists

・To cover all items
・To use as references
・To use example items as they are.
・To use example items as references

(3) Questionnaires

Questionnaires were used to elicit comments and opinions about what stood out or what could be improved in the implementation of screening and scoping work. The questionnaire form is on the next page.

Project Study on "Methods of Disaster Risk Screening and Scoping for Development Projects"
Questionnaire Issued During Pilot Studies for Forethought to Disaster Risk Reduction

Suncoh Consultants Co., Ltd.
Earth System Science Co., Ltd.

We are conducting above-captioned project study toward mainstreaming disaster risk reduction within JICA. In the study, we are developing a screening method of disaster risk and scoping lists of study items for forethoughts to disaster risk reduction in the development projects.
We have prepared drafts of screening sheets and scoping lists. The former is to screen projects which need forethoughts to disaster risk reduction, and the latter is to choose study items needed to implement with forethought to disaster risk reduction in the screened projects.

Please answer the following questions after these trials with the screening sheets and the scoping lists. We will use your opinions to improve proposed screening methods and drafts of scoping lists.

I. Screening

Question 1: How much time is required for one screening?

1. 30 minutes or less
2. 30-60 minutes
3. 1-2 hours
4. 2-3 hours
5. 3 hours or more

Question 2: Which elements of screening work took the most time? (Multiple answers allowed)

1. Accessing databases
2. Identifying target areas in databases
3. Identifying hazards
4. Comparing hazards and target areas

Question 3: Was it easy to access websites (Global Risk Platform, etc.) used during screening?

1. Yes, it was easy.
2. It took some time, but it was relatively easy.
3. No, it was extremely difficult.

Question 4: What are some possible reasons for not being able to access websites (Global Risk Platform, etc.) used during screening, or not being able to complete work as desired?

1. The Internet was not working.
2. We did not know how to use the Internet.
3. We did not know the website address.
4. Other

( )

Question 5: Do any of the following items apply to your situation? (Multiple answers allowed)

1. It was difficult to access databases.
2. It took too much time to identify target locations on databases.
3. It took too much time to identify target locations on databases because there were multiple target locations.
4. Due to the nature of the project, we determined it was necessary to check hazards at locations other than target locations.
5. It took too much time to identify target locations on databases because target locations were small.
6. Multiple checks of the same hazard were required because target locations were large.
7. It was difficult to identify hazards in target locations.
8. The print on the screening sheet was small and difficult to read.
9. It took too much time to determine hazards from databases.

Question 6: Please share any suggestions for improvement.

II. Scoping

Question 1: Were scoping lists easy to use?

1. Yes, there were no particular problems.
2. They were helpful despite the need to revise during the process.
3. They were not very helpful at all.

Question 2: How did you use scoping lists?

Scoping Lists A, A' and B

1. We used the items as listed.
2. We used items as a reference.
3. We could not use the lists, as none of the items were relevant.

Scoping List C

1. We cited items and examples word-for-word.
2. We used items, but cited some examples and used others as references.
3. We used items as references.
4. We used examples as references.
5. None of the items were relevant.
6. There were so few items that there were not enough items.
7. There were so many items that it was difficult to select relevant ones.
8. The items were difficult to understand.
9. The wording of the items and examples was not relevant.

Please provide specific examples below.

Question 3. Please share any suggestions for improvement.

Thank you for your cooperation with this questionnaire.

6.2 Trial Implementation of Screening and Scoping

Table 6.2-1 is a list of pilot trials in which screening and scoping were implemented. Pilot trials were implemented for 13 experiments in December 2014 by JICA involved departments.

The trials resulted in the creation of checked screening sheets for 12 experiments and terms of reference for scoping for three experiments. Comments were submitted via questionnaire for 11 of the experiments. Each questionnaire required one answer each for roads and bridges, and industrial parks and electric distribution; thus, the people who implemented the trials answered essentially all questions.

Table 6.2-1 Implementation of pilot experiment

Experiment	Title of project	Sector	Subsector	Scoping list	Type of aid	Schemeof project
●	Preparatory Survey on the Development of the Dakar Metropolitan Area, Senegar	Urban / Regional Development	Urban planning	A'	Technical cooperation for development planning	Information Collection and Confirmation Study
●	Mombasa Special Economic Zone Development Master Plan Project in Kenya	Urban / Regional Development	Industrial park	A'	Technical cooperation for development planning	Detail planning survey
○	Provision of Apia harbor renovation plan Preparatory Survey for the safety improvement in Samoa	Transportation	Port and horbor	C	Grant aid	Preparatory study
○	The Project for Flood Disaster Rehabilitation and Mitigation in Cambodia	Transportation	Road	C	Grant aid	Preparatory study
○	Phone Bridge Feasibility Study Preparation in Laos	Transportation	Bridge	C	Grant aid	Preparatory study
●	National Electric Power System Master Plan and Update Support Project in Tanzania	Natural Resources and Energy	Electric power distribution	A'	Technical cooperation for development planning	Implementation of technical cooperation
○	Mandalay City Waterworks Emergency Readiness Survey for Private Practice in Myanmar	Water Resources and Disaster Management	Urban water supply	C	Grant aid	Preparatory study
△	Preparatory Study on Environmentally Sustainable Urban Waste Management Improvements in Laos	Environmental Management	Solid waste management	C	Grant aid	Preparatory study
○	Preparatory Survey on the Jacmel County Hospital Development in Haiti	Health	Hospital	C	Grant aid	Preparatory study
○	Asia-Pacific Development Center on Disability (APCD) Project, Phase 2	Social Security	Social welfare facility	A	Technical cooperation	Preparatory study
○	Improving the Irrigated Rice Production Area in Shokue, Mozambique Project	Agricultural/Rural Development	Agricultural development	A	Technical cooperation	Preparatory study
○	Promoting High-value Agriculture along the Sindhuli Road Project in Nepal	Agricultural/Rural Development	Agricultural development	A	Technical cooperation	Preparatory study
○	Fisheries sector master plan project for sustainable fishery in Maldives	Fisheries	Fisheries development	A	Technical cooperation for development planning	Preparatory study
13						

Note: ●**Screening: done** **Scoping: done** **Questionnaires: answered**
○**Screening: done** Scoping: none **Questionnaires: answered**
△Screening: none Scoping: none **Questionnaires: answered**

6.3 Verifying and Adjusting Screening and Scoping

Whether or not people in charge properly implemented screening of matters for which trials were performed was verified. If screening was implemented properly, the screening results (that is, whether or not the need for forethought to disaster risk reduction according to the websites used for the screening process was correct) were verified. If reports of study results had been publicized, those reports were used as the basis for verification of the need for forethought to disaster risk reduction.

6.3.1 Verifying Screening

(1) Work Time Required for Screening

Around one to two hours are required for trial results and work. Time is required when multiple target locations or wide areas are involved, but the amount required can be shortened by using multiple websites, or web browsers capable of high-speed processing.* Except in cases with many target areas or other circumstances, this simple knowledge and familiarity with these processes can reduce the time required to around 30 minutes.

*Generally, Mozilla Firefox and Google Chrome are faster at processing graphics and the like than Internet Explorer, the standard web browser that comes with Windows.

(2) Accuracy of Screening Work

Typographical errors and incorrect map readings are two of the mistakes often made during screening work.

The Table 6.3-1 shows confirmed results of whether or not screening was implemented according to prescribed methods. Work was graded according to the following distribution of points:

Non-agricultural concerns: 34 points (because there are no droughts) Agricultural concerns: 38 points (because there are droughts) *Breakdown* Correct: 2 Omitted: 1 Incorrect: 0 Hazard identification: 6 locations (7 locations) Topographical confirmation: 4 locations Needs assessment: 7 locations (8 locations) Total: 17 locations (19 locations) Note: The numbers in parentheses are for agricultural concerns.

Screening was conducted for 12 projects on the screening sheet. Four of the 12 were screened correctly, with absolutely no mistakes. On average, 92 percent of questions were answered correctly. Four projects contained places where information was omitted, four projects contained mistakes on confirmation of hazards and topography (including places where nothing was entered), and eight projects contained mistakes in the assessment of the need for forethought to disaster risk reduction (including places where nothing was entered). Eight of the 12 target projects contained some sort of mistake.

We conjecture that most of the mistakes were omissions of information or simple selection of the wrong column. As a result, evaluations of the need for the forethoughts contain many mistakes. An example of a simple selection of the wrong column is when a situation was evaluated as not requiring consideration despite the confirmation of a hazard.

We were unable to identify any places in trial projects where mistakes were particularly likely.

There was one apparent mistake in specifying target locations, but it did not affect the confirmation of hazards or topography even when there were multiple target areas or when the target area was large.

What to check when confirming hazards within a target area and using multiple evaluations to do so (an example is evaluating floods at three stages: one- to five-year events, 5- to 50-year events, and 50-year and above events.) was not clarified.

To improve upon this, we improved the screening sheet and revised the operation manual.

Table 6.3-1 Verification of screening correctness

Title of project	Correctness		Remarks
Preparatory Survey on the Development of the Dakar Metropolitan Area, Senegar	34 / 34	100.0%	
Mombasa Special Economic Zone Development Master Plan Project in Kenya	34 / 34	100.0%	
Provision of Apia harbor renovation plan Preparatory Survey for the safety improvement in Samoa	21 / 34	61.8%	Omissions: 5 Hazard confirmation errors: 2 Evaluation errors: 2
The Project for Flood Disaster Rehabilitation and Mitigation in Cambodia	33 / 34	97.1%	Omission: 1
Phone Bridge Feasibility Study Preparation in Laos	32 / 34	94.1%	Omissions: 2
National Electric Power System Master Plan and Update Support Project in Tanzania	34 / 34	100.0%	
Mandalay City Waterworks Emergency Readiness Survey for Private Practice in Myanmar	31 / 34	91.2%	Omissions: 3
Preparatory Study on Environmentally Sustainable Urban Waste Management Improvements in Laos			Screening shest were not returned.
Preparatory Survey on the Jacmel County Hospital Development in Haiti	30 / 34	88.2%	Topographical error: 1 Evaluation error:1
Asia-Pacific Development Center on Disability (APCD) Project, Phase 2	28 / 34	82.4%	Topographical error: 1 Evaluation errors:2
Improving the Irrigated Rice Production Area in Shokue, Mozambique Project	36 / 38	94.7%	Evaluation errors:1
Promoting High-value Agriculture along the Sindhuli Road Project in Nepal	38 / 38	100.0%	
Fisheries sector master plan project for sustainable fishery in Maldives	30 / 34	88.2%	Evaluation errors:2
Average		91.5%	

(3) Screening Precision

Even screening implemented correctly does not guarantee that the determination on forethought to disaster risk reduction is correct. The reference databases are reliable, as UNEP and NASA built them, but they cover the entire world, and thus cannot accurately express every single area. In addition, determinations differ depending on the topographical precision of the databases.

Table 6.3-2 shows the results of verifying pilot trials. The following describes the accuracy of trial results and the relevance of screening results.

(i) Accuracy of trials

○: Screening was implemented properly.

△Triangle: Screening work was not implemented properly, but screening results are correct.

×: Screening results are incorrect.

(ii) Relevance of accurate screening results

This is a determination of whether or not the results of screening implemented properly are appropriate on practical projects.

◯: Screening was implemented properly.

×: Screening was implemented properly, but there are problems with the results in the actual needs of forethought to disaster risk reduction.

When verification results in a determination that screening work was implemented correctly, two of the 13 projects were thought to have determinations on actual forethought to disaster risk reduction that differed from the assessment of whether or not to consider disaster risk reduction. Therefore, it was determined that relevance can be ensured at a relatively high rate of success.

Table 6.3-2 Verification of validity of screening (1/5)

Preparatory Survey on the Development of the Dakar Metropolitan Area, Senegar					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Needed	○	○	Forethought to DRR is necessary.	
Landslide	Not needed	○	○	No disaster risk	
Earthquake	Not needed	○	○	No disaster risk	
Tsunami	Needed	×	○	No disaster risk	Tsunami hazard was not identitified. Understanding of screening method was not insufficient.
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

Mombasa Special Economic Zone Development Master Plan Project in Kenya					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Needed	○	○	Forethought to DRR is necessary.	
Landslide	Not needed	○	○	No disaster risk	
Earthquake	Not needed	○	○	No disaster risk	
Tsunami	Needed	○	○	Forethought to DRR is necessary.	
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

Provision of Apia harbor renovation plan Preparatory Survey for the safety improvement in Samoa					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	△	○	Forethought to DRR is necessary.	No check hazard and topography on the screeningsheet.
Tropical Cyclone	Needed	○	○	Forethought to DRR is necessary.	
Storm Surge	Needed	△	○	Forethought to DRR is necessary.	No check topography on the screeningsheet.
Landslide	Not needed	△	○	No disaster risk	No check hazard and topography on the screeningsheet.
Earthquake	Needed	×	○	No disaster risk	Identification of hazard was incorrect.
Tsunami	Needed	△	○	Forethought to DRR is necessary.	No check hazard on the screeningsheet.
Volcano	Not needed	×	○	Forethought to DRR is necessary.	Volcano is located in the island.
Drought	—	—	—	For agricultural project only.	

Table 6.3-2 Verification of validity of screening (2/5)

The Project for Flood Disaster Rehabilitation and Mitigation in Cambodia					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	Study about forethought to DRR was done.
Tropical Cyclone	Not needed	○	○	Forethought to DRR is necessary.	
Storm Surge	Not needed	○	○	Forethought to DRR is necessary.	
Landslide	Not needed	○	○	No disaster risk	
Earthquake	Not needed	○	○	No disaster risk	
Tsunami	Not needed	○	○	No disaster risk	
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

Phone Bridge Feasibility Study Preparation in Laos					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Not needed	○	○	No disaster risk	
Landslide	Needed	○	○	Forethought to DRR is necessary.	
Earthquake	Not needed	○	○	No disaster risk	
Tsunami	Not needed	○	○	No disaster risk	
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

National Electric Power System Master Plan and Update Support Project in Tanzania					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Needed	○	○	Forethought to DRR is necessary.	An coastal area is included in the project site.
Landslide	Needed	○	○	Forethought to DRR is necessary.	
Earthquake	Needed	○	○	Forethought to DRR is necessary.	
Tsunami	Needed	○	○	Forethought to DRR is necessary in the coastal area	An coastal area is included in the project site.
Volcano	Needed	○	○	Forethought to DRR is necessary.	
Drought	—	—	—	For agricultural project only.	

Table 6.3-2 Verification of validity of screening (3/5)

Mandalay City Waterworks Emergency Readiness Survey for Private Practice in Myanmar					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Omitted	×	○	Forethought to DRR is necessary.	Nthing were cheked. Screening was not conducted.
Landslide	Omitted	×	○	No disaster risk	Although, identified hazard and confirmed topography, evaluation was not checked.
Earthquake	Needed	○	○	Forethought to DRR is necessary.	
Tsunami	Not needed	○	○	No disaster risk	
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

Preparatory Study on Environmentally Sustainable Urban Waste Management Improvements in Laos					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	—	○	Forethought to DRR is necessary.	Disaster history caused by flood was comfirmed.
Tropical Cyclone	Not needed	—	○	No disaster risk	Disaster history caused by tropical cyclone was not comfirmed.
Storm Surge	Not needed	—	○	No disaster risk	Laos is inland country.
Landslide	Needed	—	×	Forethought to DRR is necessary.	Screening result was "forethought to DRR is needed, but disaster history caused by landslide was not conirmed.
Earthquake	Needed	—	○	Forethought to DRR is necessary.	Disaster history caused by eartjquake was not comfirmed. But in long term viewpoint, erthquake might occur.
Tsunami	Not needed	—	○	No disaster risk	Laos is inland country.
Volcano	Not needed	—	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

Note:Screensheet which was filled in at the trial expriment was not available.

Preparatory Survey on the Jacmel County Hospital Development in Haiti					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Not needed	×	○	Forethought to DRR is necessary.	Evaluation should be done by not only hazard but also topography.
Tropical Cyclone	Needed	○	○	Forethought to DRR is necessary.	
Storm Surge	Needed	○	○	Forethought to DRR is necessary.	
Landslide	Needed	○	○	No disaster risk	
Earthquake	Needed	×	×	No disaster risk	By disaster history, forethought to DRR is needed. Screening result was incorrect.
Tsunami	Needed	×	○	No disaster risk	Tsunami hazard was not identified by screening. Understanding of screening method was not insufficient.
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

Table 6.3-2 Verification of validity of screening (4/5)

Asia-Pacific Development Center on Disability (APCD) Project, Phase 2					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Needed	×	○	No disaster risk	Bangkok is located in 20km far from the sea.
Landslide	Not needed	○	○	No disaster risk	
Earthquake	Not needed	○	○	No disaster risk	
Tsunami	Needed	×	○	No disaster risk	Bangkok is located 20km far from the sea.
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

Improving the Irrigated Rice Production Area in Shokue, Mozambique Project					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Needed	○	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Not needed	○	○	No disaster risk	
Landslide	Not needed	○	○	No disaster risk	
Earthquake	Not needed	○	○	No disaster risk	
Tsunami	Not needed	○	○	No disaster risk	
Volcano	Not needed	○	○	No disaster risk	
Drought	Not needed	×	○	For agricultural project only.	Draught hazard was checked. Evaluaion's check may be omitted.

Promoting High-value Agriculture along the Sindhuli Road Project in Nepal					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Not needed	×	○	Forethought to DRR is necessary.	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Not needed	○	○	No disaster risk	
Landslide	Needed	○	○	Forethought to DRR is necessary.	
Earthquake	Needed	○	○	Forethought to DRR is necessary.	
Tsunami	Not needed	○	○	No disaster risk	
Volcano	Not needed	○	○	No disaster risk	
Drought	Needed	○	○	Forethought to DRR is necessary.	

Table 6.3-2 Verification of validity of screening (5/5)

Fisheries sector master plan project for sustainable fishery in Maldives					
Type of Disaster	Trial experiment		Correct screenig result	Validity of screening result	Comment
	Screening result	Correctness			
Flood	Not needed	○	○	No disaster risk	
Tropical Cyclone	Not needed	○	○	No disaster risk	
Storm Surge	Not needed	×	○	Forethought to DRR is necessary.	Topography was checked. Evaluation's check may be omitted.
Landslide	Not needed	○	○	No disaster risk	
Earthquake	Not needed	○	○	No disaster risk	
Tsunami	Not needed	×	○	Forethought to DRR is necessary.	Both hazard and topography was checked. Evaluation's check may be omitted.
Volcano	Not needed	○	○	No disaster risk	
Drought	—	—	—	For agricultural project only.	

(4) Problems with Access to Reference Databases

Accessing websites that serve as databases is considered the most problematic factor of screening. This includes issues such as slow browsing speeds or inability to access websites, and needing to access multiple webpages.

Reference databases are as explained below, and all but Google Maps are inaccessible at some point or another. The most effective way of solving the problem is to attempt to access the websites at a different time. However, when access is not possible even then, alternative databases will be used.

SEDAC data is not as precise as GRDP data (see Tables 6.3-3 & 6.3-4). Thus, differences in screening results are possible. In addition, it takes time to identify locations on SEDAC because its maps only display place names and international boundaries; they do not display any other administrative boundaries. The maps of SEDAC also cannot be enlarged to the extent that those of GRDP can, decreasing screening precision when target areas are small. Screening results for 10 of the experiments suggested as pilot experiments were compared, and differences between the screening results of SEDAC and GRDP data occurred for tropical cyclones, earthquakes and droughts. Differences could also occur for tsunami. The precision of the hazard grids for floods were the most different from one another, but floods are determined through a combination of Hazards indicators and topographical interpretation, thus extreme differences do not occur.

Table 6.3-3 Difference in Spatial Resolution of GRDP and SEDAC Data

Hazard	Global Risk Data Platform	Socioeconomic Data and Applications Center
Flood	Apprx.1km	Apprx.100km
Tropical Cyclone	Apprx.2km	Apprx.5km
Storm surge	—	—
Landslide	Apprx.1km	Apprx.5km
Earthquake	Apprx.1km	Apprx.50km
Tsunami	Apprx.1km	—
Volcano	—	Apprx.50km
Drought	Apprx.50km	Apprx.200km

Table 6.3-4 Comparison of screening results with 2 screening sheets

Title of project	Screenig								Sector	Subsector	Difference
	Flood	Tropical cyclone	Storm surge	Lnadslide	Eathquake	Tsunami	Volcano	Drought			
Preparatory Survey on the Development of the Dakar Metropolitan Area, Senegar	●	○		○	○	○		○	Urban / regional developmen	Urban planning	The evaluation by flood hazard is deifferent. But add concerning topographical data, get same evaluation.
Mombasa Special Economic Zone Development Master Plan Project in Kenya	●	○		○	×	×		○	Urban / regional development Private sector developmen	Industrial park	Evaluation Earthquake1;Not Need 2;Need
Preparatory survey on the project for Nadzab (Lae) airport rehabilitation in Independent state of Papua New Guinea	●	○		○	○	○		●	Transport	Air port	
Provision of Apia harbor renovation plan Preparatory Survey for the safety improvement in Samoa	●	●		○	○	○		×	Transport	Port and horbor	Evaluation Drought 1;Not need 2;Need
The Project for Flood Disaster Rehabilitation and Mitigation in Cambodia	●	○		○	○	○		○	Transport	Road	
Preparatory Survey on Technical Standard Study and Detail Design Study for Greater Cairo Metro Line No.4 Project	●	○		○	●	○		○	Transport	Railway	
Preparatory Survey on the Construction of the Coal-fired Power Plant in Chittagong, Bangladesh	●	●		○	●	●		●	Natural resource and energy	Thermal power plant	
Feasibility Study on the Improvement of Water Supply in Rural Areas, Senegal	●	○		○	○	○		●	Water resources / Disaster management	Rural water suply	
Preparatory Survey for the Sewer Improvement Project in Ranchi, India	●	×		○	×	○		●	Environmental management	Waste water treatm	Evaluation Tropical cyclone1;Not need 2;Need1 Erthquake 1;Not need 2;Need
Preparation of Fishing Ports Project III in the Philippines (Fishing Port Development Plan, Fishing Port Design, Fish Product Distribution)	●	●		●	●	●		○	Fishery	Fishery port	

Note:

1) ● Evaluate "need" and no difference ○Evaluate "not need" and no difference
× Different evaluation
2) For storm surge and volcano, there is no difference in screening.
3) Screening of drought hazard is needed only for agricultural project.
4) 1:GRDP 2:SEDAC+NOAA-NGDC

Workarounds Developed

GRDP provides raster data with GeoTIFF and other geographical information added, and is downloadable and can be viewed using GIS software. This workaround is possible in environments where GIS software can be used. As Figure 6.3-1 shows, this workaround can be used to achieve the same results as viewing the data online.

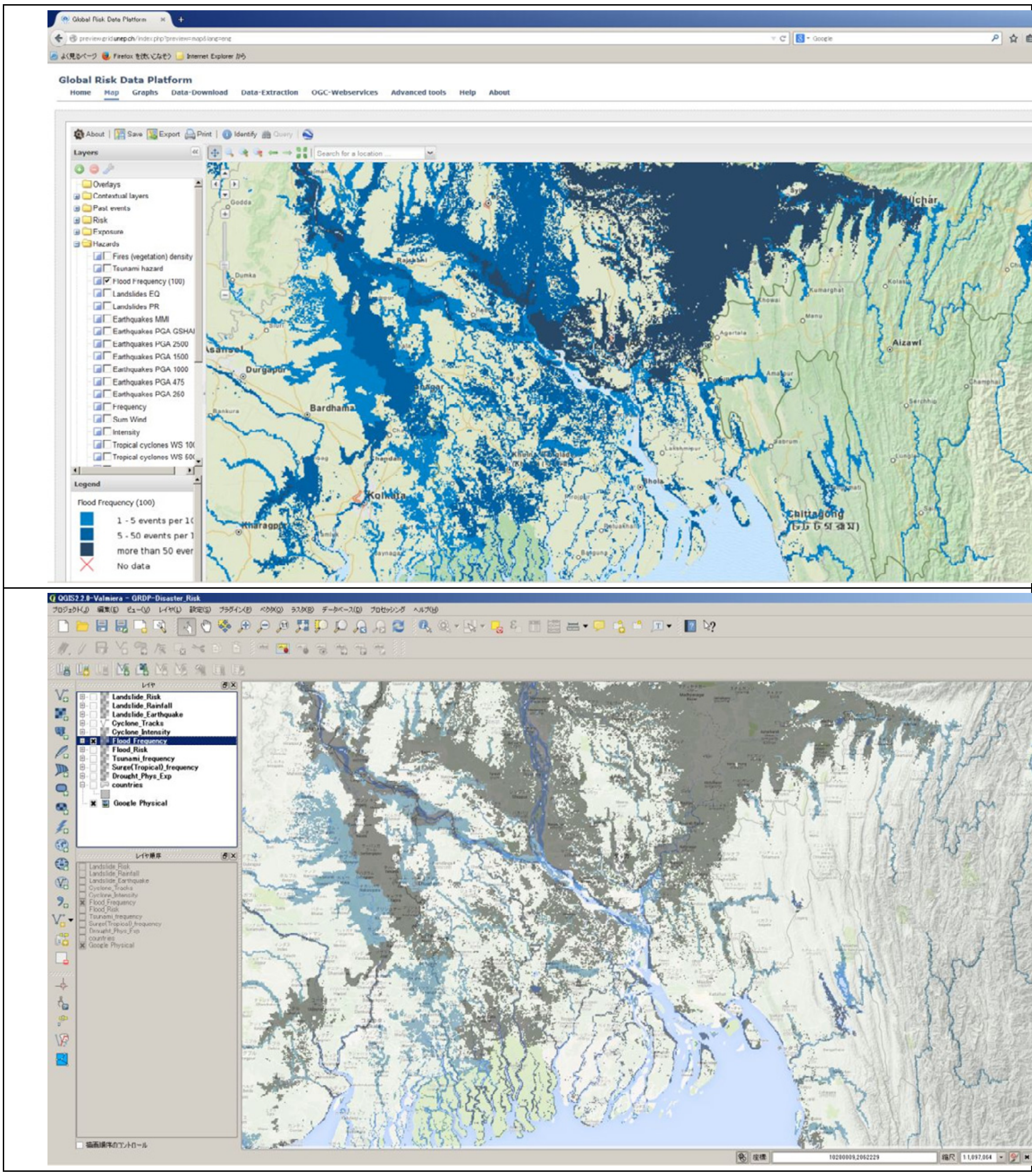


Figure 6.3-1 Viewing GRDP Data Using GIS

Above: GRDP website
Below: Displaying downloaded data via QGIS[47]
This is a display of flood hazards in Bangladesh.

6.3.2 Verification of Scoping Results

Answers to the questionnaire on trials revealed that scoping lists were generally usable, with no major problems.

One problem mentioned was that it was not possible to determine the extent to which to

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[47]GIS: Geographic Information System
QGIS: Open-source GIS software available at http://www2.qgis.org/ja/site/ and others.

implement studies of list items (for example, the range of flood depth to study when a history of flooding was confirmed).

Scoping lists are mainly used by management-level personnel in leading departments that prepare instructions. Thus, they are used for citations, reference and many other purposes. In addition, they have only been revised slightly because they will continue to be revised as operation progresses.

No study content is to be added to scoping lists, but recommendations of types of disasters determined by screening to warrant forethought to disaster risk reduction are to be added to study overviews and backgrounds.

We got terms of reference for only three experiments as scoping results, so that scoping result could not be evaluated adequately. However, the answers of questionnaire showed that the scoping list is useful. Furthermore, promotional activities must be undertaken in the near future.

6.3.3 Cost Considerations

Cost increases for work implementation were considered for revising terms of reference in pilot projects for which existing terms of reference were obtained.

Table 6.3-5 is a list of the 10 projects for which costs were considered. Disaster risk reduction was identified in two of the projects; study teams had already been assigned to those projects.

Table 6.3-5 Projects considered cost when adding study of forethought to DRR

Title of project	Trial experiment of scoping		Screenig result (corrected)								Type of aid	Schemeof project
	JICA	Consultant	Flood	Tropical cyclone	Storm surge	Landslide	Earthquake	Tsunami	Volcano	Drought		
Preparatory Survey on the Development of the Dakar Metropolitan Area, Senegar	●	●	■		■						Technical cooperation for development planning	Information Collection and Confirmation Study
Mombasa Special Economic Zone Development Master Plan Project in Kenya	●	●	■					■			Technical cooperation for development planning	Detail planning survey
Provision of Apia harbor renovation plan Preparatory Survey for the safety improvement in Samoa		●	■	■	■			■	■		Grant aid	Preparatory study
The Project for Flood Disaster Rehabilitation and Mitigation in Cambodia		●	■								Grant aid	Preparatory study
Phone Bridge Feasibility Study Preparation in Laos	●		■		■	■	■	■	■		Grant aid	Preparatory study
Mandalay City Waterworks Emergency Readiness Survey for Private Practice in Myanmar		●	■				■				Grant aid	Preparatory study
Preparatory Study on Environmentally Sustainable Urban Waste Management Improvements in Laos		●	■			■	■				Grant aid	Preparatory study
Asia-Pacific Development Center on Disability (APCD) Project, Phase 2		●	■								Technical cooperation	Preparatory study
Improving the Irrigated Rice Production Area in Shokue, Mozambique Project		●	■							■	Technical cooperation	Preparatory study
Fisheries sector master plan project for sustainable fishery in Maldives		●			■			■			Technical cooperation for development planning	Preparatory study
Number	3	9										

Note: ● Trial experiment of scoping was conducted.
■ Screened as "forethought to DRR was needed".

Cost considerations revealed two cases where disaster risk reduction team members had already been assigned, four cases where concurrent assignments given to members allowed the work volume (in man-months) to fall within scope, and two cases where members must be newly assigned for forethought to disaster risk reduction. Table 6.3-6 shows the results of cost considerations for each project.

For the three cases where disaster risk reduction team members had already been assigned, the member assigned to Senegal was assigned to urban disaster risk reduction and environmental and social considerations, the member assigned to Cambodia was assigned to flood control planning, and the member assigned to Myanmar was assigned to water supply and wastewater facility planning and design. Naturally, these assignments generated no additional costs. In particular, the instructions for the design on the Myanmar project included details about disaster risk reduction and response for floods and earthquakes; thus, it was probably not necessary to add a new team member. For the three cases where concurrent assignments given to members allowed the work volume to fall within scope (Samoa, Laos and Thailand), the target area was a point and thus small. Team members had already been assigned to study natural conditions in Samoa and Laos, and an expert was dispatched in Thailand, meaning that either one was probably well taken care of. There were two projects where team members could be given concurrent assignments at a cost; costs increased by six man-days in Kenya and by three man-days in the Maldives. The Kenya project involved development of a special economic zone, thus the target area was large. The Maldives is an island nation, thus the area is small, but the work required interviews. There were two cases requiring the assignment of new members - one requiring around one man-month of work in Laos and another requiring around 1.5 man-months in Mozambique. The work differed between the two - urban waste and irrigation for wetland rice farming - but neither was a typical construction project. Thus, it is possible that forethought to disaster risk reduction could have been omitted in the past. The projects also required a vast target area, necessitating action on a planar level.

The overall results of cost considerations for pilot trials show that new costs are highly likely to increase when the target area is planar, and that costs are highly like to rise by several man-months in atypical construction projects involving structures other than bridges, facilities or the like. The results also showed that costs do not increase when the target area is a location, or increase only slightly. We were unable to perform any pilot trials for linear targets this time, but costs would probably rise as in the planar example, because study scopes become wider the longer linear projects extend.

Table 6.3-6 Result of cost consideration

Title of project	Adding team member				Total		Oversea		Domestic		Remarks
	Add	No	Concurrently	Category	M/D	M/M	M/D	M/M	M/D	M/M	
Preparatory Survey on the Development of the Dakar Metropolitan Area, Senegar		○									Already included as urban disaster risk reduction/environmental and social considerations.
Mombasa Special Economic Zone Development Master Plan Project in Kenya			○	Industrial park / utility	6	0.217	5	0.167	1	0.05	The Dongo Kundu area is roughly 5 km x 4 km = 20 km^2 On-site work is envisioned to be two days for interviews of disaster risk reduction agencies, local authorities, etc., two days of field investigations (10 km2 per day) and one day of aggregation. One day of domestic organization is envisioned..
Provision of Apia harbor renovation plan Preparatory Survey for the safety improvement in Samoa			○	Ntural condition survey / ESC							Studies of natural conditions are in a separate estimate. There are no particular increases to labor costs due to forethought to DRR. In all it should be possible to absorb 15.7 man-months.
The Project for Flood Disaster Rehabilitation and Mitigation in Cambodia											Already included as a flood control plan.
Phone Bridge Feasibility Study Preparation in Laos			○	Ntural condition survey or ESC							Some studies of natural conditions are in a separate estimate. There are no particular increases to labor costs due to DRR. In all it should be possible to absorb 13.87 man-months.
Mandalay City Waterworks Emergency Readiness Survey for Private Practice in Myanmar			○	Planning and designing of water supply							Forethought to DRR have already been included, and only names have been added because considerations are also done for earthquakes.
Preparatory Study on Environmentally Sustainable Urban Waste Management Improvements in Laos	○				20	0.75	15	0.5	5	0.25	Adding a team member for forethought to DRR is probably appropriate. Studies of natural conditions (hydrology) are required. Local: 0.5 man-months; Domestic: 0.25 man-months
Asia-Pacific Development Center on Disability (APCD) Project, Phase 2		○									Overall terms of reference not obtained. The improved training for operation and maintenance by dispatched experts can probably be absorbed in the initial labor cost (one man-month).
Improving the Irrigated Rice Production Area in Shokue, Mozambique Project	○				33	1.233	25	0.833	8	0.4	The addition of disaster risk reduction team members on the same schedule as other consultant team members is envisioned. (The way of counting for domestic work is different from what it was then, thus it is 1.233 man-months while under the old way of thinking it was field survey + work in Japan 33 days = 1.1 man-months.)
Fisheries sector master plan project for sustainable fishery in Maldives			○	Develolpment of fishery sector	3	0.117	2	0.067	1	0.05	On-site work is one day for interviews of disaster risk reduction agencies, etc., and one day of field investigations (deemed to be enough given small area of the islands and lack of undulation). One day of work in Japan is envisioned.

Note: In remarks, DRR means disaster risk reduction

7. Considering the Process of Introducing Methods for Considering the Need for Forethought to Disaster Risk Reduction

7.1 Considering Introduction within JICA

The following items will be implemented in the consideration of introducing these methods within JICA.

(1) Add a column on the necessity of forethought to disaster risk reduction to the official request

We considered adding a column for historical information about natural disasters to the official request. In interviews, thematic departments said JICA must internally discuss changes to the official request form.

(2) Explaining ways to implement disaster risk reduction consideration methods

Meetings must be held to explain implementation methods to JICA employees. In addition, the Handbook for Mainstreaming Disaster Risk Reduction: Compilation of Forethought to disaster risk reduction must be distributed as a manual. It must be explained that the handbooks are to be used for screening and scoping methodology, and also as a collection of examples, and examples of implementing forethought to disaster risk reduction must be introduced.

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7.2 Considering Maintenance of Methodology

The Disaster Management Team of the Global Environment Department is responsible for maintenance of methodology. The following items are suggested for considering maintenance of methodology.

(i) Maintenance of natural disaster information sources

Websites used as databases for screening must be checked.

The status of websites used for screening will be checked periodically (Check database updates, interface and other factors around once per year to fully understand the status of websites. If website specifications change significantly, consider the need to update the manual or perform other actions.). In addition, it is necessary to use random sampling to periodically check the precision of screening results, and to check that screening results reflect the work (meaning, to check scoping results).

(ii) Update screening sheets and scoping lists

Data servers for screening must be established and maintained. Check to ensure screening precision (checking of all projects by the Disaster Risk Reduction Group; in addition, implementation of screening by the Disaster Risk Reduction Group) Check that screening results reflect the work (checking of all projects by the Disaster Risk Reduction Group) (meaning, check scoping results) Implement follow-up studies from screening through project implementation in pursuit of effects of forethought to disaster risk reduction.

To efficiently implement the above, it is best to establish a department in charge of forethought to disaster risk reduction within the Disaster Risk Reduction Group or independent from the Disaster Risk Reduction Group.

8. Creating the Handbook for Mainstreaming Disaster Risk Reduction(DRR) (Forethought to DRR for Development Project)

Damage from natural disasters has grown more severe in recent years, and flood damage due to abnormal weather has increased. In addition, although peace building and reconstruction following conflict are currently listed as focal issues in Japanese official development assistance(ODA), techniques for delivering assistance for these issues have not been sufficiently established.[48]

JICA promotes the involvement of its overseas offices in project development and other processes in pursuit of a hands-on style. JICA continues to make preparations to help its employees by storing and organizing past experience and examples from Japan as its intellectual property. JICA is also improving its knowledge management to fully use the knowledge and experience amassed in Japan to develop and implement projects, and this handbook was created as a part of that effort.

We envision that JICA employees and JICA experts will be the users of the Disaster Risk Reduction Mainstreaming Handbook: Compilation of Forethought to disaster risk reduction. JICA employees will use this handbook to create terms of reference and other documents in the design and study stages of JICA projects, and JICA experts will incorporate aspects of forethought to disaster risk reduction into international cooperation when implementing actual projects.

We sifted through a wide range of documents and examples of forethought to disaster risk reduction in Japan - including past examples from the Edo Period - for this handbook. We did our best to use plain language and avoid using technical terminology so that the handbook could enlighten even employees who are not experts in disaster risk reduction about forethought to disaster risk reduction. In addition, the handbook introduces examples by JICA sector classification to show how JICA considers disaster risk reduction for each and every issue amidst a situation where assistance techniques for forethought to disaster risk reduction have not been established. Finally, the handbook explores ways to establish and sustain standards and culture for forethought to disaster risk reduction in work under JICA management.

The Disaster Risk Reduction Mainstreaming Handbook: Compilation of Forethought to disaster risk reduction comprises the following six chapters.

1. Developing the handbook

2. About “Mainstreaming Disaster Risk Reduction
3. Method of Disaster Risk Screening and Scoping for JICA's Projects
4. JICA’s Disaster Risk Screening and Scoping for Development Projects: Explanation of Implementation Methods in Projects
5. Mainstreaming disaster risk reduction in Japan
6. Examples of mainstreaming disaster risk reduction

Chapters 1 and 2 are a summary of the basic approach to and history behind “mainstreaming disaster risk reduction,” a phrase that has been used frequently in recent years by the UN and other organizations, and a basic explanation of the promotion of efforts toward that end. Chapter 3 reviews the past actions of JICA in disaster risk reduction and ensures the establishment of a common understanding within JICA. Chapter 4 explains specific methods of implementing screening and scoping for forethought to disaster risk reduction explained in this report. Chapters 5 and 6 are a summary of specific examples from Japan that serve as references for the JICA Global Environment Department, which has been in charge of concerns about disaster risk reduction to date, and other departments to mainstream disaster risk reduction in projects under JICA management.

9. Third UN World Conference on Disaster Risk Reduction

The Third UN World Conference on Disaster Risk Reduction (WCDRR) was held March 14-18, 2015 in the city of Sendai in Miyagi Prefecture. The five-day conference was attended by over 6,500 people, including representatives of the 187 UN member states, UN organizations, donors and NGOs. Including the events and exhibitions for the general public, roughly 143,000 people attended the conference. Many heads of state, vice heads of state and cabinet members attended in addition to people in charge of disaster risk reduction. It was the largest UN-related international conference ever held in Japan.

JICA participated in ministerial-level round-table discussions, working sessions and other high-level sessions of the main conference, and also hosted public events on the topic of mainstreaming disaster risk reduction: the Great East Japan Earthquake Forum, a public forum hosted with cooperation from relevant agencies from developing countries and international organizations, and a booth exhibit for residents of Sendai.

At Disaster Risk Reduction and International Cooperation, a symposium for discussing the future of disaster risk reduction policy in each country and of international cooperation itself, the discussion turned to the substantial assistance Japan received from over 100 countries and regions throughout the world in the wake of the Great East Japan Earthquake that struck Tohoku in 2011. Japanese leadership resolved to contribute to international disaster risk reduction strategies, verbalizing renewed feelings of an interdependent relationship with the world and the duty to contribute what it learned from each country's assistance to post-HFA strategy. The challenges of reducing disaster risk and mainstreaming disaster risk reduction were raised toward that end. In addition, natural disasters have increased in severity in recent years, and pose a threat to advanced nations and developing countries alike. Japanese leaders acknowledged that developing countries are particularly susceptible to disasters, which present obstacles against sustainable development and cause poverty to increase. They continued, asserting that "much assistance for recovery and reconstruction has been delivered through international cooperation after natural disasters strike, but to build more disaster-resilient communities we must increase our investment in disaster risk reduction in advance of disasters, not after they have struck. Japan has a long history of facing the threat of natural disasters by investing in disaster risk reduction in advance. Mainstreaming disaster risk reduction, which means introducing disaster risk reduction viewpoints to all sectors involved in social and economic development, has supported the economic development of Japan. Mainstreaming disaster risk reduction has been vital toward developing sustainably and creating a disaster-resilient community."

Heads of state from countries with deep ties with Japan and relevant personnel from international organizations discussed the direction of international disaster risk reduction policy in a panel discussion entitled "International Cooperation in Disaster Risk Reduction." The panel discussed advance investment in disaster risk reduction, efforts to enhance the capacity of central government agencies, and the Build Back Better initiative that seizes on the opportunity of reconstruction to build more disaster-resilient communities, in addition to international cooperation and mainstreaming disaster risk reduction. Each country expressed its views in light of its experiences, and all countries agreed that, in order to promote advance investment in disaster risk reduction, it is important to fully understand the risks of natural disasters, and to consider disaster risk reduction from the viewpoints of women, children, elderly people, people with disabilities and other vulnerable people. There was much interest in the Build Back Better initiative, which uses disasters as opportunities to build more disaster-resilient communities.

One outcome of the conference was the approval of the Sendai Framework for Disaster Risk Reduction 2015-2030 and the Sendai Declaration.

●Sendai Declaration

1. We, the Heads of State and Government, ministers and delegates participating in the Third United Nations World Conference on Disaster Risk Reduction, have gathered from 14 to 18 March 2015 in Sendai City of Miyagi Prefecture in Japan, which has demonstrated a vibrant recovery from the Great East Japan Earthquake in March 2011. Recognizing the increasing impact of disasters and their complexity in many parts of the world, we declare our determination to enhance our efforts to strengthen disaster risk reduction to reduce disaster losses of lives and assets from disasters worldwide.

2. We value the important role played by the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters during the past ten years. Having completed the assessment and review of and considered the experience gained under its implementation, we hereby adopt the Sendai Framework for Disaster Risk Reduction 2015-2030. We are strongly committed to the implementation of the new framework as the guide to enhance our efforts for the future.

3. We call all stakeholders to action, aware that the realization of the new framework depends on our unceasing and tireless collective efforts to make the world safer from the risk of disasters in the decades to come for the benefit of the present and future generations.

4. We thank the people and the Government of Japan as well as the City of Sendai for hosting the Third United Nation World Conference on Disaster Risk Reduction and extend our appreciation to Japan for its commitment to advancing disaster risk reduction in the global development agenda.

●Sendai Framework for Disaster Risk Reduction 2015-2030

Sendai Framework for Disaster Risk Reduction is a plan defined what member countries to do over the next 15 years 2015-2030, to achieve the substantial reduction of disaster risk and losses.

The outline of Sendai Framework is shown below, which is summarized with the "Chart of the Sendai Framework"[49] by UNISDR and the gist of Sendai Framework summarized by Ministry of foreign affairs of Japan.

Scope and purpose

The present framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks. It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors.

Expected outcome

●The substantial reduction of disaster risk and losses in lives, livelihoods and health.

●The substantial reduction of disaster risk and losses in in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

[49] http://www.unisdr.org/we/inform/publications/44983

Goals

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.

Targets

1.Substantially reduce global disaster mortality by 2030.
2. Substantially reduce the number of affected people globally by 2030.
3. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
4.Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
6. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.
7. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

4 priorities for Action

There is a need for focused action within and across sectors by States at local, national, regional and global levels in the following four priority areas.

1 Understanding disaster risk
2 Strengthening disaster risk governance to manage disaster risk
3 Investing in disaster risk reduction for Priority Understanding disaster risk resilience
4 Enhancing disaster preparedness for effective response, and to《Build Back Better》 in recovery, rehabilitation and reconstruction

Guiding principles

(a)Primary responsibility of States to prevent and reduce disaster risk, including through cooperation

(b)Shared responsibility between central Government and national authorities, sectors and stakeholders as appropriate to national circumstances.

(c)Protection of persons and their assets while promoting and protecting all human rights including the right to development

(d)Engagement from all of society

(e)Full engagement of all state institutions of an executive and legislative nature at national and local levels

(f)Empowerment of local authorities and communities through resources, incentives and decision-making responsibilities as appropriate.

(g)Decision-making to be inclusive and risk-informed while using a multi-hazard approach.

(h)Coherence of disaster risk reduction and sustainable development policies, plans, practices and mechanisms, across different sectors.

(i) Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk.

(j)Addressing underlying risk factors cost-effectively through investment versus relying primarily on postdisaster response and recovery.

(k)"Build Back Better" for preventing the creation of, and reducing existing, disaster risk.

(l) The quality of global partnership and international cooperation to be effective, meaningful and strong.

(m)Support from developed countries and partners to developing countries to be tailored according to needs and priorities as identified by them.

CLASSIFICATION OF DISASTER

【Classification of Disasters】

1.UNISDR

Types	Category	Examples
Natural hazard	Hydrometeorological hazard	Tropical,cyclones (also known as typhoons and hurricanes), thunderstorms, hailstorms,tornados,blizzards, heavy snowfall,avalanches, coastal storm surges, floods including flash floods, drought, heatwaves and cold spells
	Geological hazard	Earthquakes, volcanic activity and emissions, and related geophysical processes such as mass movements, landslides, rockslides, surface collapses, and debris or mud flows
	Biological hazard	Outbreaks of epidemic diseases, plant or animal contagion, insect or other animal plagues and infestations
	difficult to categorize	Tsunami
Tchonological hazard		Industrial pollution, nuclear radiation, toxic wastes, dam failures, transport accidents, factory explosions, fires, and chemical spills etc.
Socio natural hazard		Landslides, flooding, land subsidence and drought etc.(with overexploited or degraded land and environmental resources)

Source: UNISDR(2009) "*UNISDR Terminology on Disaster 2009*"

2-1.EM-DAT(1/2)

Disaster Group	Disaster Subgroup	Definition	Disaster Main Type
Natural	Geophysical	A hazard originating from solid earth. This term is used interchangeably with the term geological hazard.	Earthquake
			Mass Movement
			Volcanic activity
	Meteorological	A hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that last from minutes to days.	Extreme Temperature
			Fog
			Storm
	Hydrological	A hazard caused by the occurrence, movement, and distribution of surface and subsurface freshwater and saltwater.	Flood
			Landslide
			Wave action
	Climatological	A hazard caused by long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal climate variability.	Drought
			Glacial Lake Outburst
			Wildfire
	Biological	A hazard caused by the exposure to living organisms and their toxic substances (e.g. venom, mold) or vector-borne diseases that they may carry. Examples are venomous wildlife and insects, poisonous plants, and mosquitoes carrying disease-causing agents such as parasites, bacteria, or viruses (e.g. malaria).	Epidemic
			Insect infestation
			Animal Accident
	Extraterrestrial	A hazard caused by asteroids, meteoroids, and comets as they pass near-earth, enter the Earth's atmosphere, and/or strike the Earth, and by changes in interplanetary conditions that effect the Earth's magnetosphere, ionosphere, and thermosphere.	Impact
			Space weather
Technological	Industrial accident		Chemical spill
			Collapse
			Explosion
			Fire
			Gas leak
			Poisoning
			Radiation
			Other
	Transport accident		Air
			Road
			Rail
			Water
	Miscellaneous accident		Collapse
			Explosion
			Fire
			Other

Source: EM-DAT Website

2-2.EM-DAT(2/2)

Geophysical

Disaster Generic Group	Disaster Subgroup	Disaster Main Type	Disaster Sub-Type	Disaster Sub-Sub-Type
Natural Disaster	Geophysical	Earthquake	Ground Shaking	
			Tsunami	
		Mass Movement		
		Volcanic activity	Ash fall	
			Lahar	
			Pyroclastic flow	
			Lawa flow	

Meteorological

Disaster Generic Group	Disaster Subgroup	Disaster Main Type	Disaster Sub-Type	Disaster Sub-Sub-Type
Natural Disaster	Meteorological	Storm	Extra-tropical storm	
			Tropical storm	
			Convective Storm	Derecho
				Hail
				Lightning/thunderstorm
				Rain
				Tornado
				Sand/dust storm
				Winter storm/blizzard
				Storm/surge
				Wind
		Extreme temperature	Cold wave	
			Heat wave	
			Severe winter conditions	Snow/ice
				Frost/freeze
		Fog		

Hydrological

Disaster Generic Group	Disaster Subgroup	Disaster Main Type	Disaster Sub-Type	Disaster Sub-Sub-Type
Natural Disaster	Hydrological	Flood	Coastal food	
			Riverine flood	
			Flash flood	
			Ice jam flood	
		Landslide	Avalanche (snow, debris, mudflow, rockfall)	
		Wave action	Rogue wave	
			Seiche	

Climatological

Disaster Generic Group	Disaster Sub-Group	Disaster Main Type	Disaster Sub-Type	Disaster Sub-Sub-Type
Natural Disaster	Climatological	Drought		
		Glacial Lake Outburst		
		Wildfire	Forest Fire	
			Land fire: Brush, bush, Pasture	

Biological

Disaster Generic Group	Disaster Sub-Group	Disaster Main Type	Disaster Sub-Type	Disaster Sub-Sub-Type
Natural Disaster	Biological	Epidemic	Viral Disease	
			Bacterial Disease	
			Parasitic Disease	
			Fungal Disease	
			Prion Disease	
		Insect infestation	Grasshoper	
			Locust	
		Animal Accident		

Extraterrestrial

Disaster Generic Group	Disaster Sub-Group	Disaster Main Type	Disaster Sub-Type	Disaster Sub-Sub-Type
Natural Disaster	Extraterrestrial	Impact	Airburst	
		Space weather	Energetic particles	
			Geomagnetic storm	
			Shockwave	

http://www.emdat.be/new-classification

Source: EM-DAT Website

3.IFRC

Types		Definition	
Natural hazards	Geophysical	Earthquakes	
		Mass movement dry	Subsidences, rockfalls, avalanches and landslides
		Volcanic eruptions	
	Hydrological	Flood	General floods and flash floods
		Mass movement wet	Subsidences, rockfalls, avalanches and landslides
	Climatological	Extreme temperatures	Heat wave, cold wave and extreme winter conditions
		Drought	
	Meteorological	Tropical storms, hurricanes, cyclones and typhoons	
		Storms and tidal waves	Winter storm, severe storm or thunderstorm, hailstorm, lighting, tornadoes, local wind storm, san storm/dusr storm, snow storm,taidal wave/storm surge, gllacier lake outburst flood (Jökulhlaup)
		Wildfires / urban fires	
	Biological	Disease epidemics	
		Insect/animal plagues	
Technological or man-made hazards		Complex emergencies/conflicts	
		Famine,food insecurity	
		Displaced populations,	
		Industrial accidents	Accident release, explosions, chemical explosion, nuclear explosion/radiation, mine explosion, pollusion, acid rain, chemical pollution, atomosphere pollution
		Transport accidents	

Source: IFRC Website

SCREENING SHEET

(Note！)In case "Global Risk Data Platform" is inaccessible, use "screening sheet2".

Project Title	

Disaster Risk Screening Sheet

Object	Needs Survey	Hazard Identification		Topography Identification	Result of screening 2)
Data Level	Basic Information	Main Data Source	Source for Volcano	Main Data Source	
Data sources / Hazards	Project survey sheet 1)	UNEP / UNISDR Global Risk Data Platform	NASA U.S.A Socioeconomic Data and Applications Center	Google Map / Google Earth	
Flood	Description of disaster risk ☐Yes→Disaster Risks Existence ☐No	Hazards/Flood Frequency(100)(1km Grid) ☐1～5(events/100y.) ☐5～50(events/100y.) ☐50<(events/100y.) ☐No Data		・Located in large river delta ・Located near river ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Tropical cyclone	Description of disaster risk ☐Yes→Disaster Risks Existence ☐No	Hazards/Frequency ☐0.25>(events/y.) ☐0.25～0.50(events/y.) ☐0.50～0.75(events/y.) ☐0.75～1.00(events/y.) ☐1.00～1.24(events/y.) ☐No Data			Disaster Risk Existence ☐ Yes ☐ No
Storm surge	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No			・Located in coastal area ・Located in E.L.10m or below ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Land-slide	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No	Hazards/Landsilides PR(1km Grid) ☐Low ☐Medium ☐High ☐Very High ☐No Data(上記以外)		・Located mountain or hill slope or its adjacent area ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Earth-quake	describing about disaster risk ☐Yes→Disaster Risk Existence ☐No	Hazards/Earthquakes MMI (10km Grid) ☐5～7(MMI for 10% in 50y.) ☐7～8(MMI for 10% in 50y.) ☐8～9(MMI for 10% in 50y.) ☐More than 9(MMI for 10% in 50y.) ☐No Data			Disaster Risk Existence ☐ Yes ☐ No
Tsunami	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No	Hazards/Tsunami (1km Grid) ☐0.2> ☐0.2～0.4 ☐0.4～0.6 ☐0.6～0.8 ☐0.8～1.0 ☐No Data		・Located in coastal area ・Located in E.L.35m or below ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Volcano	describing about disaster risk ☐Yes→Disaster Risk Existence ☐No		Global Volcano Hazard Frequency and Distribution, v1 (50km Grid) ☐1～10 ☐11～30 ☐31～60 ☐61～130 ☐No Data		Disaster Risk Existence ☐ Yes ☐ No
Drought Agricultural project	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No	Past events/Drought events(50km Grid) ☐Yes ☐No Data			Disaster Risk Existence ☐ Yes ☐ No

(20150128版)

1) When description concernig disaster risk recognized in Project survey sheet, disaster risk reductiuon will be considered.

2) For each disaster, when all items are checked "No" or "No Data", the disaster risk reduction will not be considered.

（Note！）In case "Global Risk Data Platform" is inaccessible, use "screening sheet2".

Project Title	

Disaster Risk Screening Sheet

Object	Needs Survey	Hazard Identification		Topography Identification	Result of screening[2]
Data Level	Basic Information	Main Data Source	Source for Volcano	Main Data Source	
Data sources / Hazards	Project survey sheet[1]	UNEP / UNISDR Global Risk Data Platform	NASA U.S.A Socioeconomic Data and Applications Center	Google Map / Google Earth	
Flood	Description of disaster risk ☐Yes→Disaster Risks Existence ☐No	Hazards/Flood Frequency(100)(1km Grid) ☐1～5(events/100y.) ☐5～50(events/100y.) ☐50<(events/100y.) ☐No Data		・Located in large river delta ・Located near river ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Tropical cyclone	Description of disaster risk ☐Yes→Disaster Risks Existence ☐No	Hazards/Frequency ☐0.25>(events/y.) ☐0.25～0.50(events/y.) ☐0.50～0.75(events/y.) ☐0.75～1.00(events/y.) ☐1.00～1.24(events/y.) ☐No Data			Disaster Risk Existence ☐ Yes ☐ No
Storm surge	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No			・Located in coastal area ・Located in E.L.10m or below ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Land-slide	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No	Hazards/Landsilides PR(1km Grid) ☐Low ☐Medium ☐High ☐Very High ☐No Data(上記以外)		・Located mountain or hill slope or its adjacent area ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Earth-quake	describing about disaster risk ☐Yes→Disaster Risk Existence ☐No	Hazards/Earthquakes MMI (10km Grid) ☐5～7(MMI for 10% in 50y.) ☐7～8(MMI for 10% in 50y.) ☐8～9(MMI for 10% in 50y.) ☐More than 9(MMI for 10% in 50y.) ☐No Data			Disaster Risk Existence ☐ Yes ☐ No
Tsunami	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No	Hazards/Tsunami (1km Grid) ☐0.2> ☐0.2～0.4 ☐0.4～0.6 ☐0.6～0.8 ☐0.8～1.0 ☐No Data		・Located in coastal area ・Located in E.L.35m or below ☐Yes ☐No	Disaster Risk Existence ☐ Yes ☐ No
Volcano	describing about disaster risk ☐Yes→Disaster Risk Existence ☐No		Global Volcano Hazard Frequency and Distribution, v1 (50km Grid) ☐1～10 ☐11～30 ☐31～60 ☐61～130 ☐No Data		Disaster Risk Existence ☐ Yes ☐ No
Drought Agricultural project	Description of disaster risk ☐Yes→Disaster Risk Existence ☐No	Past events/Drought events(50km Grid) ☐Yes ☐No Data			Disaster Risk Existence ☐ Yes ☐ No

（20150128版）

1) When description concernig disaster risk recognized in Project survey sheet, disaster risk reductiuon will be considered.

2) For each disaster, when all items are checked "No" or "No Data", the disaster risk reduction will not be considered.