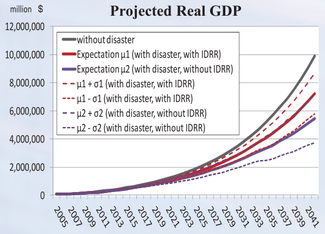
Tools to link DRR and Sustainable Development

DR²AD (DRR investment Accounts for Development) Model

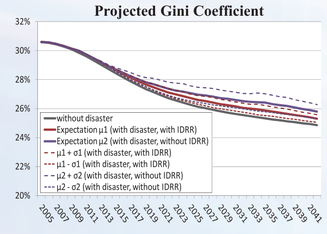
Together with a team of consultants and academia, JICA has developed a Dynamic Stochastic General Equilibrium (DSGE) model, named "DR²AD Model", to simulate impacts on 1) economic growth under long-term disaster risk with or without DRR investment, and on 2) the Gini coefficient in consequence of DRR investment. With this modeling exercises, JICA is actively engaged in demonstrating the critical role of DRR investment for sustainable development.

The Model has been applied to the case of Pakistan, and showed that **with DRR investment, approximately 25% higher economic growth** (real GDP) and **0.5% lower Gini coefficient** are realized at the year 2042 compared to the case without DRR investment.

It should be noted that **DR²AD is presented as VERSION1.0, and is subject to improvements and modifications**. JICA intends to release the source of this model to the public, and collaborate with the international community to continue upgrading DR²AD VERSION1.0 so that DR²AD Model would serve as an indicative basis to promote investment in DRR.



Expected GDP with and without DRR investment (Case of Pakistan)

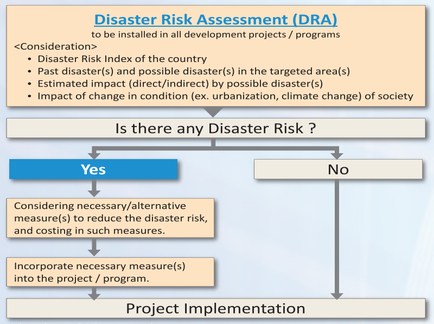


Expected Gini Coefficient with and without DRR investment (Case of Pakistan)

Disaster Risk Assessment to be installed in all development projects / programs

DRR consideration needs to be incorporated into development project implementation. JICA is now considering to install a process of Disaster Risk Assessment (DRA) into all its projects / programs to make sure that DRR consideration is factored-in to all interventions.

Since all development projects / programs undergo Environment Impact Assessment (EIA), developing a similar process or adding on to existing assessment framework might be the way forward.



(Flowchart of DRA process)

Three Principles for Low Regret DRR Investment
-Lessons Learnt from Recent Mega Disasters-

Based on the lessons learned from recent mega disasters, such as the Great East Japan Earthquake (March, 2011) and the Thailand Flood (October, 2011), JICA developed three principles to be considered in implementing DRR projects / programs to ensure disaster risk is adequately taken care of and that countermeasures are sustainable.

1. Risk Literacy :

Viewpoint to enhance the ability to recognize disaster risks and to take proper actions .
(Example)
Evacuation drills, disaster education, awareness raising programs, etc.

Workshop on hazard map (Source: Kokusai Kogyo Co.,Ltd.)

Evacuation drill in Takaishi city , Osaka, Japan (Source: Kokusai Kogyo Co.,Ltd.)

2. Redundancy :

Viewpoint to reduce disaster risks through multi-layer and/or multi-sector countermeasures.
(Example) Adding DRR consideration to roads, public buildings, communication lines, etc.

The highway in eastern Sendai, Japan. It functions as a dike and, stopped tsunami inpouring into housing area during the Great East Japan Earthquake. (Source: Tohoku Regional Bureau, MLIT, Japan , 2011)

3. Kaizen :

Viewpoint to continuously improve and update countermeasures to deal with changing disaster risks.
(Example)
Adapting to climate change, urbanization, etc.

Changes in Chao Phraya River basin, Thailand (left) farmland in 1990 (right) flooded industrial area in 2011

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Linking Disaster Risk Reduction to Sustainable Development

The Great East Japan Earthquake (2011)

Earthquake in Haiti (2010)

Flood in Thailand (2011)

As a country that has a long history in being affected by various disasters, Japan has been incorporating Disaster Risk Reduction (DRR) consideration into its plans and investments in order to reduce the impact of disasters on the overall development process. The approach of Japan to cope with disasters has been to learn lessons from grieving impacts caused by disasters, and install renewed resilient system to mitigate future damages.

Japan International Cooperation Agency (JICA) is the development agency of the Government of Japan, which carries out cooperation activities that is rooted in Japanese experience. Thus, naturally JICA's approach has been to continuously extend cooperation in the field of DRR with the aim to build capacities of developing countries to cope with disasters as means to achieve sustainable development.

DRR investment essential for sustainable development

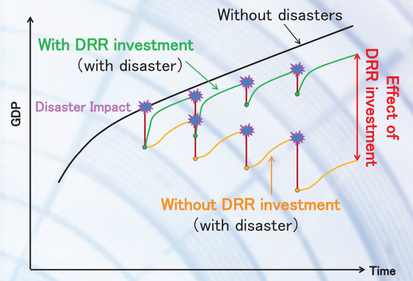


Image of co-relation between DRR investments and economic growth (GDP)

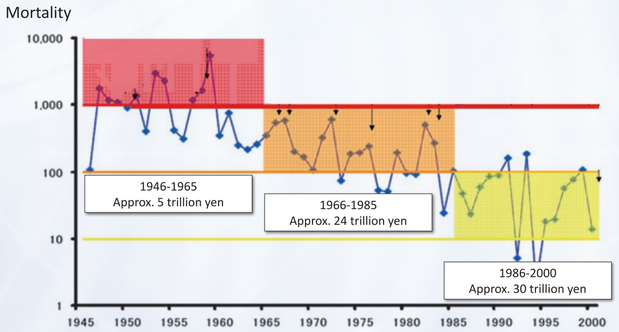
JICA views that DRR investment is an essential investment to be made to achieve economic growth and, subsequently, sustainable development.

DRR investment covers both investments in DRR as an independent sector, as well as those in other sectors that has DRR consideration incorporated.

JICA will enhance its support to projects / programs of other sectors that incorporates DRR consideration to contribute to building a resilient society, which embodies sustainable development, in the context of development cooperation.

DRR investment saves lives

Case of Japan

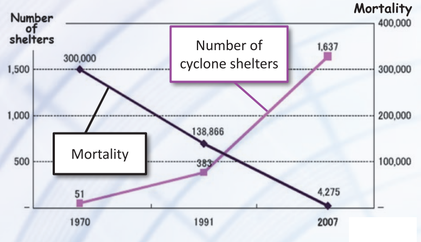


Government expenditure on flood control measures and the mortality caused by floods, landslides, volcanic eruptions (Expenditure in 1995 constant yen) (Source: MLIT)

The experience of Japan proves that DRR investments is essential to reduce mortality of disasters. Although, Japan is now considered to have built a resilient society against disasters; however, this is not an achievement overnight. Japan has been continuously damaged and affected by major disasters, and learning from such experience, consistent efforts to identify risk areas and to take preventive countermeasures were made. Japan's DRR effort started from a simple point protection structure, which was expanded to a region based more sophisticated structure, accompanied by upgraded forecast and warning system.

Case of Bangladesh

Multipurpose cyclone shelter built by JICA



(Source: Cabinet Office based on WFP data)

Since 1993, JICA has been supporting the Government of Bangladesh to build cyclone shelters to protect its people living in high risk areas from cyclone disasters. As the number of cyclone shelters increase, the mortality drastically decreased, which also proves that DRR investment saves lives.

Actual Cases — Linking DRR to Sustainable Development

JICA is accumulating experience **in incorporating DRR consideration into various development projects / programs** that is not necessarily a DRR project.

Rural Development + DRR consideration

Myanmar: The Project for Preservation of Farming Area for Urgent Rehabilitation of Agricultural Production and Rural Life in Areas Affected by Cyclone Nargis (2009-2011)

In response to the Cyclone Nargis, which caused severe damage to Myanmar, JICA together with Myanmar Ministry of Agriculture and Irrigation implemented a project focusing on recovery of agricultural production as well as farmland preservation. Within the scope of this project, JICA not only implemented demonstration projects to formulate master plan for restoration of agriculture production and rural development, but also restored the embankments to protect the agriculture production areas from saline water intrusion, in order to resist future cyclone and flooding disaster.

Repaired floodgate of a ring dike

Repaired wind break mangrove forest

Highway Construction + DRR consideration

Cambodia: The Project for the Improvement of the National Road No.1 (2002-2012)

National Road No.1 connects the Cambodian Capital Phnom Penh and Ho Chi Minh City, the economic center of Vietnam. Historically, the road had been continuously affected by floods. In 2000, the National Road No. 1 was inundated for more than 1,000km by a major flood, which caused severe disruption in the economic activity as well as negatively affected the everyday life of people. JICA extended its supported to raise elevation of the road surface, which provides safe traffic flow as well as an evacuation space for the people during flood.

Before improvement

After improvement

Industrial Development Regional Cooperation + DRR consideration

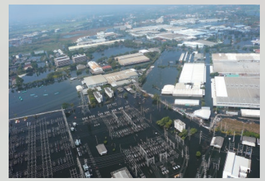
ASEAN: "Natural Disaster Risk Assessment and Area Business Continuity Plan (BCP) Formulation for Industrial Agglomerated Areas in the ASEAN Region" (2013-)

In 2011, record-breaking rainfall caused large scale flood in Chao Phraya basin, including Bangkok and Ayuttaya, an industrial agglomerated area, which is the economic engine of Thailand. The flood caused devastating damage not only to the economic activity of Thailand but to the whole region since supply chain of various products is interlinked. JICA responded to this disaster in a comprehensive way by immediately sending-in relief supplies as well as by dispatching a needs assessment team and a drainage team to support Thai Government respond to the emergency situation. Followed by this immediate emergency action, JICA extended its support to develop a comprehensive multi-sector master plan to cope with flood risks in the future with viewpoints of agriculture sector and industrial (private) sector.

JICA Drainage Team in action

JICA Flood Management Master Plan Team

Inundated industrial zone (1)



Inundated industrial zone (2)

Mindful that mega-disasters have impacts far beyond one country, JICA has embarked on a project to develop a database by collecting, analyzing and filing information on natural disaster risks, industrial agglomerated areas, infrastructure on life-lines and supply chains in 10 ASEAN member countries. Within the scope of this project, Regional BCPs (Business Continuity Plan) will be prepared for the industrial agglomerated areas in Indonesia, the Philippines and Vietnam.
With this project, JICA expects to contribute in introducing DRR consideration into the industrial sector, which is the engine of sustainable development in the region, as well as to encourage the private sector to further consider disaster risks in doing business in a resilient manner.