



Sanjaya Bhatia  
Knowledge Management Officer

## Why Climate Change Adaptation in Recovery?

To enhance –

- Value of investments
- Resilience of investments
- Life of investments

2



INTRODUCTION

## Introduction to Key Issues

### Issue 1: Enhancing Climate -Resilient Livelihoods in Recovery

- Approach 1:** Post-Disaster Recovery Needs Assessment & Targeting for Livelihood Recovery
- Approach 2:** Community-Based Needs Assessment and Targeting (CBT)
- Approach 3:** Agricultural Livelihoods Coping Strategies
- Approach 4:** Protect Indigenous Varieties to Improve Livelihoods and Biodiversity
- Approach 5:** Climate-Proof Livelihood Recovery Through Asset Protection
- Approach 6:** Climate Friendly Natural Resource Use in Recovery
- Approach 7:** Composting: A Futuristic Adaptation and Mitigation Initiative for Solid Waste Management
- Approach 8:** Innovations in Livelihood Sector Recovery

3



INTRODUCTION

## Introduction to Key Issues

### Issue 2 : Adapting to Climate Change: Build Stronger Infrastructure to Reduce Risk

- Approach 1:** Flood-Resilient Building in Recovery
- Approach 2:** Balanced Sectoral Recovery Intervention: Infrastructure and Livelihoods
- Approach 3:** Localized Approaches for Climate-Resilient Urban Flood Management

4



INTRODUCTION

**Issue 3 : Strong Institutional Support for Climate-Resilient Recovery**

- Approach 1:** Integrated Climate Risk Management in Recovery Through Local Institutions
- Approach 2:** Building Local Institutions and Local Capacities for Increased Resilience to Climate Change
- Approach 3:** Prioritized Recovery Interventions in Line with Pre-Disaster Development Initiatives
- Approach 4:** Climate-Resilient Recovery through Insurance Services
- Approach 5:** Post-Recovery Risk Reduction Strategies with Respect to Climate Change
- Approach 6:** Zonation and Land Use Planning as a Risk Reduction Approach to Deal with Adverse Effects of Climate Change.
- Approach 7:** Managing Climate Risk Incorporating Climate Information into Decision-Making
- Approach 8:** Responding to Climate Change



**Issue 4 : Community-Based Approaches**

- Approach 1:** Preparing Communities for Climate-Resilient Recovery
- Approach 2:** Participatory Community Learning: Climate Field School

**Issue 5 : Climate Change and Human Health in Recovery**

- Approach 1:** Climate-Smart Urban and Health Care Design Fostering Synergy Between Mitigation and Adaptation
- Approach 2:** Children's Health Care and Climate Change



**Implementation Guide:**

- Approach 1:** Take Stock of the Available Information on Hazards, Exposure, Vulnerabilities, and Risk Assessment Before Making Intervention Decisions
- Approach 2:** Consider Both Climate Change and Non-Climate Factors when Implementing Climate Change Adaptation Decisions
- Approach 3:** Vulnerability Reduction and Risk Reduction: Adaptations Along the Hazard-Vulnerability-Risk Continuum
- Approach 4:** Dealing with Climate Change Adaptation Mapping: Identifying the Institutions, Policies and Mechanisms Already in Plans for Reducing Disaster Risk
- Approach 5:** Plan an Integrated Program to Tackle Both Climate Change Adaptation and Risk Reduction
- Approach 6:** Community-Based Climate Change Adaptation Model: Institutionalize Through Local Government
- Approach 7:** Post-Disaster Surge Capacity Management: Strengthening Everyday 'Lifestyle Issues' of Key Persons to Leverage Surge Capacity During Disasters



**ENHANCING CLIMATE-RESISTANT LIVELIHOODS IN RECOVERY**



**Livelihoods options must consider impact of climate change on the traditional livelihoods in the area.**



The needs assessment will result in the formulation of a long-term recovery program in each sector and geographic area, identifying opportunities from both climate change adaptation and risk reduction perspectives.

Options

1. Recovery as a opportunity for Development (Case 2) - Government Ownership in Needs Assessment Key to the Recovery Program in Mozambique - Recovery was seen by the government as an opportunity to move parts of the country forward, acting as an engine for development.



The majority of those affected by climate change are in predominantly agricultural societies.

During post-disaster livelihood recovery, poorer households usually cut back on non-food expenditures, selling their assets (including livestock) and borrowing to purchase food.

Options

1. Floating gardens provide a place for growing crops protected from flooding (Case 6) - As the land floods, the raft will float up and the vegetables will be safe.
2. Cage aquaculture makes it possible to raise fish in flood prone bodies of water (Case 7) - Why not try and use flooded land as a resource?
3. Seed variety can mitigate salinity (Case 8) - long-forgotten traditional rice varieties that have an age-old ability to resist high salinity in soil and water



1. Floating gardens provide a place for growing crops protected from flooding (Case 6) - As the land floods, the raft will float up and the vegetables will be safe.



Source: New Agriculture  
<http://www.new-ag.info/focus/focusItem.php?a=941>



Source: CLIMATE CHANGE AND DISPLACEMENT  
<http://www.fmreview.org/FMRpdfs/FMR31/54-55.pdf>



#### Approach 5: Climate-Proof Livelihood Recovery Through Asset Protection

- The supply of replacement livestock is an important aspect of livelihood recovery and also improves food security.
- The sustainability of livestock management must be enhanced in volatile environments by developing support systems

#### Options

1. **Livestock policies include stocking and destocking in response to seasonal supply of fodder, and livestock that is more drought resistant (Case 10) – In India, the strategy used by the communities is to purchase animals during the rainy season, when fodder is available, and sell them during the summer season when there is a shortage of fodder. But the greater incidence of drought in recent years has contributed to a sharp decline in livestock populations – need for support systems**

13



#### Approach 6 : Climate-Friendly Natural Resource Use in Recovery

- Natural energy sources can be part of a integrated development approach to climate change.
- Clean energy technologies and efficient water resource management can be used together to improve agricultural practices, enhance food security, and generate income.

#### Options

1. **Photo-voltaic water pumping system in Brazil (Case 11) – Aims to improve agricultural productivity in this increasingly drought-prone region through the implementation of a more efficient system of irrigation which uses a solar energy**

14



#### Approach 7 : Composting; A Futuristic Adaptation Initiative for Solid Waste Management

- By composting organic waste, the amount of solid waste is drastically reduced.
- Composting practices can be implemented at the local level, and the compost produced can be sold to generate income.

#### Options

1. Adopting eco-friendly **composting** at the local level to reduce the amount of GHG gas emissions (Case 12) - Puskota (University) purchases the compost produced, which enables households to earn an income. Some people scale up their composting activities to **increase their income** by collecting additional organic waste from other households, gardens, and streets, and by selling seedlings, herbs, and vegetables grown with the compost.

15



#### Approach 8 : Innovations in Livelihood Sector Recovery

Human migration due to climate change is often caused by climate-change induced floods and droughts, which leaves the soil unproductive for crops.

#### Options

1. **Pit system of gardening in areas where soil has become unusable - (Case 13) - Hope for Climate Change Refugees in Bangladesh - Due to recurrent sand casting, the land was unable to support crops - introduced a 'pit system' of agriculture on riverbanks - Holes were dug in the sand and filled with compost and mud - Sweet gourds were planted**

16



Sandbar pits and other innovative technologies, such as floating gardens and cage fish farming, can have a huge impact on the livelihoods of people who are likely to suffer increased stress due to climate-induced disasters in flood prone areas in future



ADAPTING TO CLIMATE CHANGE:  
BUILD STRONGER INFRASTRUCTURE TO REDUCE RISK



Issue 2 : Adapting to Climate Change: Build Stronger Infrastructure to Reduce Risk

If adaptations are not made or countermeasures not taken, climate change will compromise the functionality of the existing infrastructure



Options

- 1. Flood-resistant houses in rural settlements in Bangladesh (Case 15)** - Houses built on a **raised plinth** made from sand, clay, and cement (less likely to be washed away in floods) - Recovery support for housing reconstruction should be based on indigenous designs and adaptable to flooding
- 2. Infrastructure design that considers future flooding (Case 17)** - Infrastructure climate-proofing project in Kosrae, Micronesia - Avatiu **Harbor** - Consideration was given to the impacts of global warming on wave heights - Under current climate conditions, the 50-year wave height is estimated at 10.8 m. Under the climate projected for the year 2060, the 50-year wave height increases to 12.0 m.
- 3. Integrated Climate Change and Flood Management Plan, Pune City, India (Case 18)** - Governments should ensure all **regulations** (e.g. building codes, public health regulations) are also climate-proofed

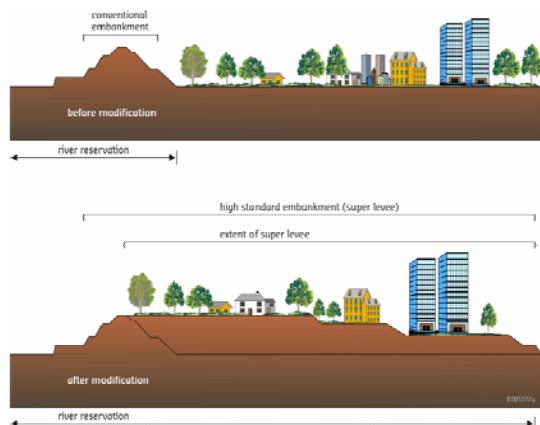


### Approach 3: Localized approaches for climate-resilient urban flood management

The ideal disaster reduction measures will incorporate a balanced combination of modern technology and traditional knowledge.

#### Options

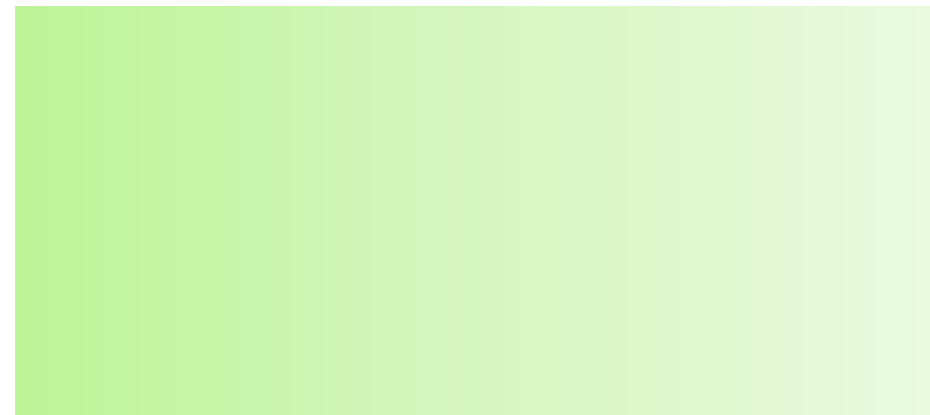
1. Super Levees offer greater protection against flooding and earthquake, and also provide space for urban development (Case 21)



21



APPROACH 3: Localized approaches for climate-resilient urban flood management



### STRONG INSTITUTIONAL SUPPORT FOR CLIMATE RESISTANT RECOVERY

22



### Approach 1 : Integrated Climate Risk Management in Recovery through Local Institutions

Local institutions know communities and should have the main responsibility for identifying the poor and vulnerable and supporting them in building safe rural and urban settlements. These institutions should ensure that climate information reaches the poorest and most vulnerable through appropriate services.

#### Options

1. As part of the recovery process, take local culture and needs into account (Case 23) - all **shelters** were built so that they could be used routinely throughout the year as **schools, health clinics, or other public facilities** - ensured that the buildings were well **maintained**
2. Government agencies developed a number of recovery projects to address **both** future climate-change-induced threats and livelihood opportunities as part of the recovery program

23



APPROACH 1 : INTEGRATED CLIMATE RISK MANAGEMENT IN RECOVERY THROUGH LOCAL INSTITUTIONS



### Some Examples of Shelter Programmes



24

## Approach 2 : Building Local Institutions and Local Capacities for Increased Resilience to Climate Change

APPROACH 2 : BUILDING LOCAL INSTITUTIONS AND LOCAL CAPACITIES FOR INCREASED RESILIENCE TO CLIMATE CHANGE

### Options

1. **Community-based water resource management** initiatives have resulted in significant local benefits to communities, including improved natural resource management and livelihoods in low rainfall environments (**Case 24**) - a **water user association (WUA)** administers water resource sharing for irrigation - The government of Maharashtra further strengthened local bodies during 2005, empowering WUAs with full legal authority to manage water distribution - Pani Panchayat initiative in Pune - managed under the principles of delinking land and water rights and cultivation of only seasonal crops

25



## Approach 3 : Prioritized Recovery Interventions in Line with Pre-Disaster Development Initiatives

APPROACH 3 : PRIORITIZED RECOVERY INTERVENTIONS IN LINE WITH PRE-DISASTER DEVELOPMENT INITIATIVES

### Options

1. **Case 25: Social infrastructure development, Chokwe, Mozambique** - the areas affected by the floods had been **poorly served** by social infrastructure, namely the health and education network, even before the floods - During the recovery phase, 249 new classrooms and two new health centers were built - Additional facilities were provided as a result of the influence of the local district authorities in accordance with previously identified priority areas - one of the main positive outcomes of the devastating floods.

26



## Approach 4 : Climate-Resilient Recovery Through Insurance Services

APPROACH 4 : CLIMATE-RESILIENT RECOVERY THROUGH INSURANCE SERVICES

### Options

1. (Case 26) - **Caribbean Catastrophe Risk Insurance Facility (CCRIF)** - furnishes **short-term liquidity** if they suffer catastrophic losses from a hurricane or earthquake - **parametric insurance** - disburses funds based on the occurrence of a predefined event of a particular intensity, with-out having to wait for onsite loss assessments
2. (Case 27) **Weather-indexed insurance for agriculture in Andhra Pradesh, India** - Less susceptible to the problems intrinsic to traditional crop insurance - **publicly available weather indicators** are the automatic trigger - reduce the insurer's administrative costs

27



## Approach 5 : Post-Recovery Risk Reduction Strategies with Respect to Climate Change

APPROACH 5 : POST-RECOVERY RISK REDUCTION STRATEGIES WITH RESPECT TO CLIMATE CHANGE

### Options

1. **Risk reduction through lifestyle adaptation (Case 31)** - Saline Water Intrusion Compel Livelihood **Shift from Agriculture to alternates** in Sundarbans, Bangladesh - promoted new hazard/saline-resilient livelihood strategies for income and food generation, including goat, duck, and hen rearing, chicken and crab farming, tree planting, introduction of salt-water tolerant vegetable gardens, and handicraft production

28



## Approach 6 : Zonation and Land Use Planning as a Risk Reduction Approach to Deal with Adverse Effects of Climate Change

- Changes in land use and land cover can contribute to climate change and variability, while a changing climate can in turn affect future land use and land cover.
- Following a major disaster recovery programs usually apply a **protective strategy** (such as building dikes & levees or sea-walls) and/or a **retreat strategy** (such as establishment of set-back zones or relocating threatened buildings).



## Approach 8 : Confronting Climate Change

### Options

1. **Proactive planning for specific eventualities (Case 33) - Reducing Risks of Glacial Lake Outburst Through Partial Drainage of the Tsho Rolpa Glacial Lake** - August 1985, an avalanche dumped tons of ice into the Dig Tsho glacial lake in eastern Nepal - The resulting 5 m wave overtopped the moraine dam and released a flood that destroyed homes, bridges, farmland, and a nearly completed hydropower plant - the government of Nepal initiated a project in 1998 to drain down the Tsho Rolpa glacial lake - the establishment of early-warning systems in 19 downstream villages - an example of **anticipatory development planning** that targets a clear impact of climate change



## COMMUNITY-BASED APPROACHES

### 5 : Community-Based Approaches

Past experience has shown clearly that villagers are willingly and voluntarily collaborating to develop and apply adaptation measures by contributing their time and resources (Francisco, 2008).

#### OPTIONS:

1. **Community-Based Adaptation to Climate Change in Vietnam (Case 34)** - The main objective was to help build adaptive strategies to enable communities to deal with recurrent climatic catastrophes - **Scenario building, Planning, Project implementation**
2. Case 36: **Managing drought through rainwater harvesting initiatives in Gujarat** - designed, maintained, and managed by the local communities - **create expanded livelihood options** - the local resource base, that is, the skills, raw materials, traditional knowledge, aptitudes, and interests of local people





Approach 2: Participatory Community Learning; Climate Field Schools

- Behavioral change in response to long-term climate change adaptation can be best achieved through participatory community learning.
- A group of farmers undergo a cyclical process of being exposed to an “experience” (actual or simulated) which they observe and reflect upon (analysis), derive lessons from (principles learned), and use as the basis for planning actual applications of such lessons and principles to immediate or future problems.

Options

1. Case 38 : **Indonesia’s Experience with Climate Field Schools (CFS)** - translating the information from scientific language into field language - Information regarding the varying dates of onset and termination of rain in different parts of the district is instrumental in setting up a cropping strategy (e.g. dry seeding vs. wet seeding) as well as in determining the timing of planting activities.



CLIMATE CHANGE AND HUMAN HEALTH IN RECOVERY



6 : Climate Change and Human Health in Recovery

Direct impacts include those due to **changes in exposure** to weather extremes (heat waves, winter cold); increases in other extreme weather events (floods, cyclones, storm-surges, droughts); and **increased production of air pollutants** and aeroallergens (spores and moulds). Additionally - **vector-borne infections**, the distribution and abundance of vector organisms and intermediate hosts, are affected by various physical factors, such as temperature, precipitation, humidity, surface water, and wind; and biotic factors, such as vegetation, host species, predators, competitors, parasites, and human interventions.

Analyses based on 57,331 admissions over a period of six years at **diarrhea** clinic in Lima, Peru revealed a **4% increase in admissions for each 1 C increase in temperature**



Approach 1: Climate-Smart Urban and Health Care Design Fostering Synergy Between Mitigation and Adaptation

Options

1. (Case 39) - **Spain: Strengthening the Existing Health Care System as Part of the Heat Wave Recovery Program** -The plan has **three levels of action** during the summer season:
  - Level 0 starts on June 1 and focuses on preparedness.
  - Level 1 is triggered during July and August and focuses on meteorological assessments (including daily recordings of temperature and humidity), disease surveillance, assessment of preventive actions, etc.
  - Level 2 is activated only if temperature rises above the warning threshold (40 C in inland areas), at which point health and social care and emergency service centers are activated - the centers identify and localize vulnerable populations
2. **Climate-smart urban design** can foster synergies between mitigation and adaptation - **Green spaces - Green-roofing** can save energy, attenuate storm water, and provide cooling



## IMPLEMENTATION GUIDE

37



## IMPLEMENTATION GUIDE

Implementing adaptation plans and strategies is a vital next step.

### Approaches Included in this Section

- **Approach 1: Take Stock of the Available Information on Hazards Exposure, Vulnerabilities, and Risk Assessment Before Making Intervention Decisions**
- **Approach 2: Consider Both Climate Change and Non-Climate Factors when Implementing Climate Change Adaptation Decisions**
- **Approach 3: Vulnerability Reduction and Risk Reduction: Adaptations Along the Hazard-Vulnerability-Risk Continuum**
- **Approach 4: Participatory Community Learning: Climate Field School**
- **Approach 5: Plan an Integrated Program to Tackle Both Climate Change Adaptation and Risk Reduction**
- **Approach 6: Community-Based Climate Change Adaptation Model: Institutionalize Through Local Government**
- **Approach 7: Promote Balanced Development that is Both Climate-Proof Against Anticipated Impacts, and Climate-Friendly to Mitigate Greenhouse Gas Emissions**
- **Approach 8: Post-Disaster Surge Capacity Management: Strengthening Everyday 'Lifestyle Issues' of Key Persons to Leverage Surge Capacity During Disasters**

38



### Approach 1: Take Stock of the Available Information on Hazards Exposure, Vulnerabilities, and Risk Assessment Before Making Intervention Decisions

- In any given location, the precise impacts of climate change are unknown. Experience shows that investments in pre-disaster policy development and planning pays dividends in terms of the quality integration of disaster risk reduction in recovery.

#### Options

- From Box 2: Good Recovery Planning  
Recovery plans should have a clear and coherent approach to disaster risk reduction, be integrated into development initiatives, be multi-hazard in nature, and where appropriate, consider climate change scenarios. **Pune City** in Maharashtra has been affected by several severe floods over the last six decades. **Anticipating an increased frequency of floods** owing to climate change, the city authorities have developed a comprehensive climate change adaptation and mitigation plan.

39



### Approach 2: Consider Both Climate Change and Non-Climate Factors when Implementing Climate Change Adaptation Decisions

There are three types of climate-sensitive decisions:

#### *Climate adaptation decisions*

Decisions must be made to manage the **expected consequences of climate variability**. These are decision areas where climatic factors have long been acknowledged as being a primary consideration in the choice of risk management options.

#### *Climate-influenced decisions*

There are also many decisions where the outcomes could be affected by climate change, but where climate change is only one of a **number of factors** involved. For example, in the post-flood recovery program in **Bangladesh**, some of the constraints faced by BRAC were a lack of seeds and organic fertilizer. The price of seeds went up in the post-flood period. Seedlings were not available in the local markets, and had to be imported. **Access to seeds** is not a climate related factor.

#### *Climate-independent decisions*

Climate-adaptation-independent decisions can be characterized as examples of unsustainable development. Examples include construction of **housing developments**, in **areas vulnerable to increased risk of coastal flooding**

40



**Approach 4: Dealing with Climate Change Adaptation Mapping; Identifying the Institutions, Policies and Mechanisms Already in Place for Reducing Disaster Risk**

In **Vietnam**, a detailed study of existing institutional mechanisms and capacities for both disaster risk reduction and adaptation was conducted in preparation for the **national policy** forum.

**Approach 6: Community Based Climate Change Adaptation Model: Institutionalize through Local Government**

**Linking Community and Government (Case 41)** Gujarat - In the rural areas of India, there is often a lack of communication between NGOs, local communities, and governmental organizations, such that important information from one sector is not shared with the others. After any major disaster local level coordination and networking, through the panchayats, proved to be a very effective way for the implementation of a rehabilitation program. **Setu** helped bridge the information gap.

41

**Approach 8: Post-Disaster Surge Capacity Management: Strengthening Everyday 'Lifestyle Issues' of Key Persons to Leverage Surge Capacity During Disasters**

**Twinning Assistance** Program (Case 42) - Surge capacity can be managed by increasing the capacity of an existing department, rather than creating a new department or agency - Agreements for human resource sharing and the prior planning of streamlined processes can facilitate and accelerate risk reduction mechanisms in recovery.

**Tools in Annex**

42



For more information and to download the Guidance notes:

[http://www.recoveryplatform.org/assets/Guidance\\_Notes/INTERNATIONAL CLIMATECHANGE\\_220910\\_without%20Source.pdf](http://www.recoveryplatform.org/assets/Guidance_Notes/INTERNATIONAL_CLIMATECHANGE_220910_without%20Source.pdf)

43

