

# Climate Change Impacts on Rural Water and Sanitation

(East Meets West Foundation and CBC)  
for the NGO Water Sanitation Working Group,  
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**East Meets West Foundation (EMWF)  
and  
Center for Business Entities & Community Development**

***Climate Change Adaptation Survey***

***Impacts on Rural Water Supply and Sanitation***

**In Quang Nam Province, Central Coastal Region of Vietnam**

**Rick McGowan, Hanoi, Vietnam, February 2009**

# Climate Change Adaptation Survey

- **Main Activities :**

- East Meets West Foundation (EMWF) and CBC carried out a survey on Climate Change Adaptation over a three month period.
- Interviewed 125 Households (HHs) in Quang Nam Province (5 HHs in 25 communes) about climate change perceptions and impacts.
- Interviewed local authorities about early warning information, disaster relief planning, infrastructure hardening.
- Compared perceptions of interviewed communities on the frequency and intensity of natural disasters and severe weather events, compared to actual meteorological data.

- Outlined implementation program to reduce adverse

# Community Mapping Exercise

Mapping exercises help communities to identify where climate change impacts (especially flooding) are most likely to occur, and how best to respond to these problems within the constraints of available resources.



# Climate Change Impacts on Rural Infrastructure

- High winds and waves from typhoons could damage or destroy inadequately protected ocean-side infrastructure (marinas, small bridges (see next slide), rural roads, electric power lines, etc.);
- Increased flooding, which could damage all kinds of rural infrastructure, especially electrical and mechanical machinery;
- Highly variable rainfall and drought, causing flooding or lack of sufficient irrigation water, either way damaging crops and possibly related infrastructure such as dams and irrigation systems;
- Potential damage to water supply and sanitation facilities, including salination (e.g., when salty water enters the groundwater or river water), and then floods fields, and the salt stays in the soil for long periods of time, making it agriculturally useless for many years;
- Poor quality design and construction of homes, schools, etc. (see below) entail otherwise avoidable damage from natural disasters and severe weather events.



# Poor Quality Easily Damaged Housing Construction



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# Good Quality Rural Infrastructure (Bamboo Bridges)

(which also need periodic repairs due to storm/flood damage)



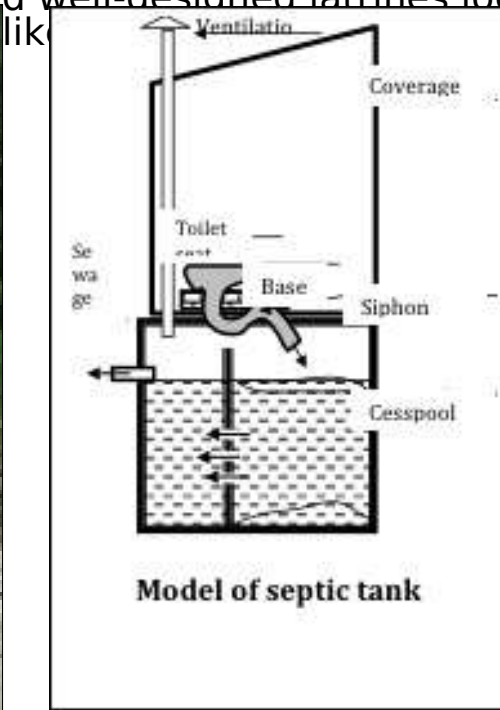
# Rural Water Supply Impacts

- Flooding can cause back-pressure on underground pipes, which if they have small cracks or are loosely joined, can allow contaminated groundwater to enter the water distribution system.
- Flooding could introduce surface contaminants into ground water sources, especially if sanitary well-heads are not properly designed.
- For rural water systems with surface water sources, increased flooding will likely increase turbidity, potentially overloading pressurized back-flush or slow sand filters.
- Contaminated groundwater could overload the water treatment system, so that water quality standards may not be able to be maintained.



# Rural Sanitation Impacts

- Where latrines are not all properly designed and constructed, flooding (even minor flooding) can easily spread fecal material around the community, leading to increased incidence of diarrheal and other diseases, especially in small children and sick people.
- Floodwaters often contaminate soils, animal feed supplies, and fresh water sources by carrying chemicals, fertilizers, trash and other debris from their original containers and locations.
- If livestock is killed by floods or severe weather and not properly buried, their remains can spread diseases to other animals and humans.
- Examples of good quality and well-designed latrines located well above anticipated



# Engineering Responses to Climate Change

The design for this EMW rural Water Treatment Plant (WTP) was modified so that all electrical and mechanical systems are now installed 2 meters higher up (rather than on the usual concrete floor slab) to avoid potential flood damage. Some EMW WTPs have had to have been modified to deal with changing water chemistry that could possibly be based on evolving climate change impacts.



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# High River Sediment Level after Rainfall Requiring More De-sedimentation at WTP

Higher sediment levels can overload and clog both slow sand and mechanical filters, and potentially generate environmental problems with sediment management.



# Peri-Urban Drainage Congestion

Natural drainage is often blocked by legal or illegal construction, and often by poor people who have few alternative options. This can cause upstream flooding, and when the blockages clear, downstream flooding that can damage or destroy poorly constructed housing.

Anticipated heavier flooding will exacerbate this situation so that when artificial blockages are flushed away, downstream areas are deluged with trash, garbage, and human and animal feces.





# Health and Economic Related Impacts

- Secondary damaged infrastructure impacts include potential lack of access to rural roads so that crops cannot get to markets in a timely manner, potentially impacting farmers' revenue streams.
- Agriculture fields, when flooded with saltwater (for example, from storm surges) become salinized, stunting or killing crops, which can sometimes last for long periods of time, again having a severe and long lasting adverse impact upon famers' incomes.
- Loss of income due to natural disasters worsens a family's economic position and makes necessary improvements in rural water supply and sanitation even more difficult to co-finance.
- Dengue fever is steadily becoming more of a problem in Vietnam, and anticipated climate change impacts such as flooding are likely to exacerbate that situation.

# Post-Flood Recovery Problems (especially for Farmers)

- Contaminated food and water supplies
- Standing, stagnant water
- Mosquitoes
- Livestock carcasses
- Sharp objects transported or blown into pastures
- Sick/diseased animals
- Wild animals displaced by floodwaters
- Damaged barbed wire fences and gates
- Weakened barns and other structures
- Eroded and unstable creek beds

(Ref: *Extension Disaster Education Network*, Texas A&M University)

# Workshops on the Results of Climate Change Adaptation Surveys

- First Workshop in Hanoi March 31;
- Second Workshop in Quang Nam Province April 15.

# EMWF Climate Change Impact Monitoring Team Inspectors



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