

**INTERNATIONAL FEDERATION OF CONSULTING ENGINEERS**



**“RESILIENCE TO NATURAL DISASTERS”  
FLOOD CONTROL STRATEGIES**

**William Howard  
FIDIC VICE PRESIDENT**

**May 9th, 2018**



## AGENDA

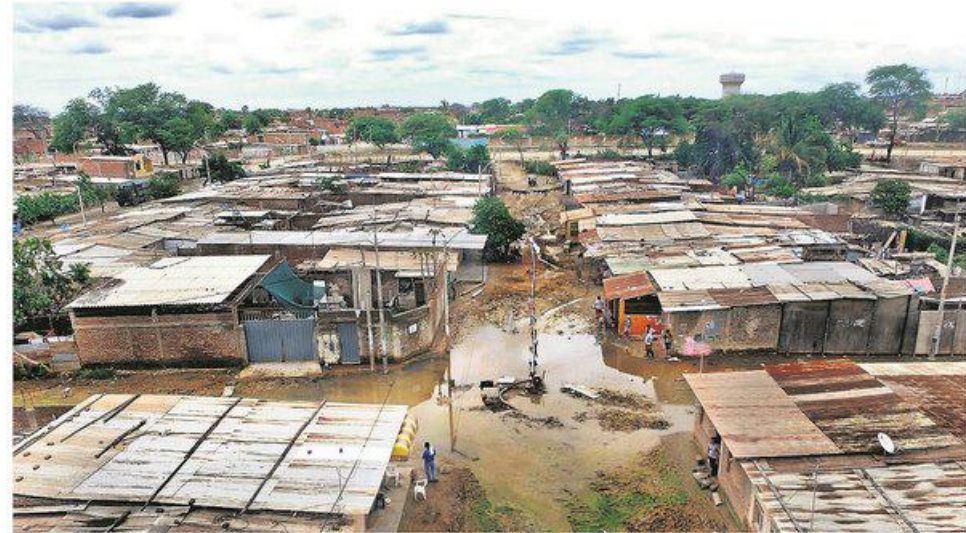
1. Global Changes
2. Natural Disasters
3. Global consequences
4. Required actions
5. Prevention
6. Flood Damage Mitigation
7. Preparedness



- OCEANS - WARMING, ACIDIFICATION, SEA LEVEL RISE and POLLUTION
- ATMOSPHERIC – CO<sub>2</sub> (400PPM+), 2 TO 5 DEGREE AVERAGE TEMPERATURE INCREASE BY 2021?
- GLACIER RETREAT (exposing mineralized rock in Peru and acidifying streams)
- MORE NATURAL DISASTERS
- **CLIMATE CHANGE IS REAL**



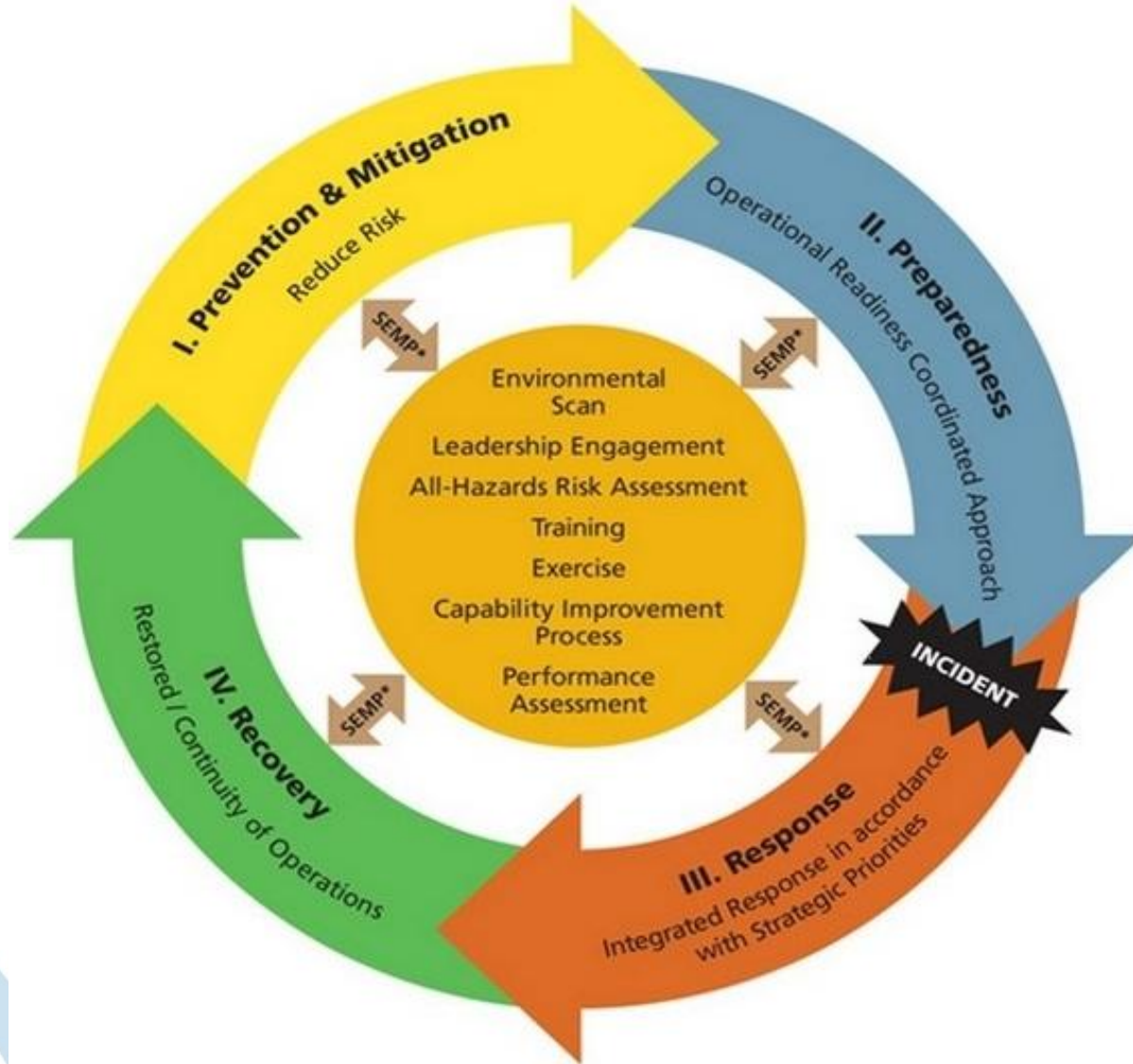
- INTENSE DROUGHTS
- INTENSE STORMS (Piura – 2,400 mm of rain in 3 months vs yearly average of 100mm)
- DEFORESTATION (a factor in Piura floods)
- LANDSLIDES
- MUDFLOWS
- FLOODS
- **THE ABOVE SIX DISASTERS ARE ALL RELATED TO EACH OTHER**



- POPULATION SHIFTS
- LOSS OF LIFE
- LOSS OF PROPERTY (\$ TRILLIONS)



# 4. Required actions



- REDUCE CO2 and OTHER GREEN HOUSE GAS EMISSIONS
- LESS USE OF FOSSIL FUELS
- CARBON SEQUESTRATION
- RESTORE FORESTS and NATURAL LANDSCAPES
- RESTORE WETLANDS
- SLOPE STABILIZATION
- **BOTTOM THREE WERE ALL FACTORS IN PIURA FLOODS**



- NEW RESERVOIRS (WATER SUPPLY, FLOOD CONTROL, POWER GENERATION, RECREATION)
- INCREASING THE CAPACITY OF EXISTING RESERVOIRS (RAISING THE ELEVATION OF DAMS, SILT REMOVAL)
- DIKES (NEW and EXISTING) – ALLOW FOR FUTURE HEIGHT INCREASES
- DETENTION BASINS
- ZONING REVISIONS
- HARDENING STRUCTURES
- MULTI USE STRUCTURES
- **HOLISTIC MULTI FUNCTIONAL STORMWATER MANAGEMENT**
- **DESIGN for UNCERTAINTY**





- DEVELOP PREDICTIVE TOOLS (study weather patterns; Piura National Security and Defense Agency monitors ocean temperatures)
- USEPA – CREAT TOOL
- EARLY WARNING SYSTEMS
- EVACUATION PLANS
- EDUCATION (awareness is the first step towards problem resolution)
- **DEVELOP A COMPREHENSIVE DISASTER MANAGEMENT PLAN (US FEMA-GUIDANCE)**



# THANK YOU

