

A NEW TOOL FOR MEASURING ADAPTATION:

THE CLIMATE VULNERABILITY REDUCTION PROJECT MANAGER

Version: Flood Defense (2017 Beta Test) (VRPM-Flood Defense 1.0™)

VRPM-Flood Defense™ Highlights

VRPM-Flood Defense™ is a comprehensive tool to evaluate and compare urban flood intervention measures taking into account existing vulnerabilities and how climate change will change these. Features include:

- The ultimate tool for planning and crediting climate adaptation into urban planning and investments: VRPM-Flood Defense uses Higher Ground Foundation's climate **Vulnerability Reduction Credit (VRC™)** approach to quantify how much different adaptations to future flooding will reduce vulnerability. This may be a key for budgeting and securing climate finance.
- Integrated Approach: Integrates baseline environmental, planning, and socio-economic factors with climate changes to give the user a robust view of impact costs, future vulnerabilities with and without expected climate change to quantify the benefits of mainstreaming climate change into urban systems.
- Effective Scenario Development Tool for Project Design: This includes translating economic impacts into "human vulnerability" through a local economic normalizer.



The Higher Ground Foundation invites your organization to consider the possibilities of a partnership to beta test VRPM-Flood Defense. This makes you a pioneer in integrating vulnerability reduction credits into the global mandate to stand up to climate change. We'd like to discuss your interests and give you a demonstration.

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The Higher Ground Foundation

- stand up to climate change

The Need for a New Understanding of Urban Flooding Hazards and Responses

Global climate warming is, to a greater or lesser extent, now inevitable and its impacts on world hydrological systems will increase in the upcoming years and decades. Urban populations will face direct threats to infrastructure and water supply as a result of enhanced and more erratic flooding owing to changes in rainfall patterns, upstream glacial melt, and increased storm and tidal surges as sea levels rise. With rapid urbanization increasing the exposure levels of communities, especially as population densities increase and run-off capacity decreases, cities will need to integrate the growing stresses of climate change into their flood protection planning and infrastructure.

The Vulnerability Reduction Project Manager

Flood defense and control options include hard infrastructure such as levees and drainage systems, ecological interventions such as green verges and floodplain management; planning and building code options, and disaster risk management planning. Together these options can all be a part of an integrated flood reduction strategy, but depending on how the options are combined, there may be more or less effective flood reduction portfolios.

To help plan, implement, and evaluate flood adaptation project options, we present the **Vulnerability Reduction Project Manager for Urban Flooding (VRPM-FloodDefense™)**. This is a comprehensive tool for planners and engineers involved in urban flood reduction to evaluate system vulnerabilities and compare and prioritize the potential impacts of competing and integrated flood management approaches.

VRPM-Flood Defense™ Features and Uses

VRPM-Flood Defense is the most advanced tool to both compare and prioritize alternative flood control approaches to manage existing hazards, future urban developments, and climate change. It gives the project

manager and funders of urban flood control a quantified, universal approach to view existing and future flood hazard vulnerability, and also a way to understand and credit projects that adapt to existing and future climate change.

Key Features

Integrated Approach

VRPM-FloodDefense integrates baseline environmental and built environment factors (hydrology, engineering, planning, building codes, etc.) plus (demographic, social, economic, land use change) and relevant climate changes (especially precipitation) to come up with:

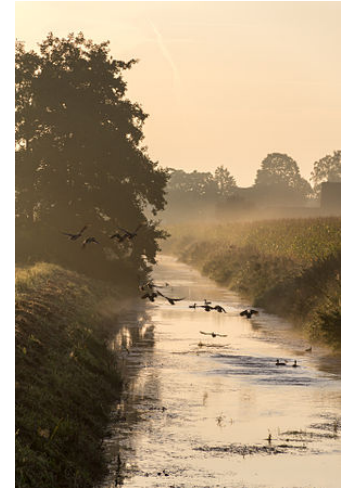
- Baseline vulnerabilities, based on impacts costs,
- Vulnerabilities going forward, without climate changes, and,
- Impact of climate change on future (and if data input, past) vulnerability scenarios.

Effective Scenario Development Tool for Project Design

Working with the project engineers and flood and drainage experts, the **VRPM-Flood Defense** tool allows for the array of different conventional and unconventional interventions to be assessed for their impact on reducing flood costs.

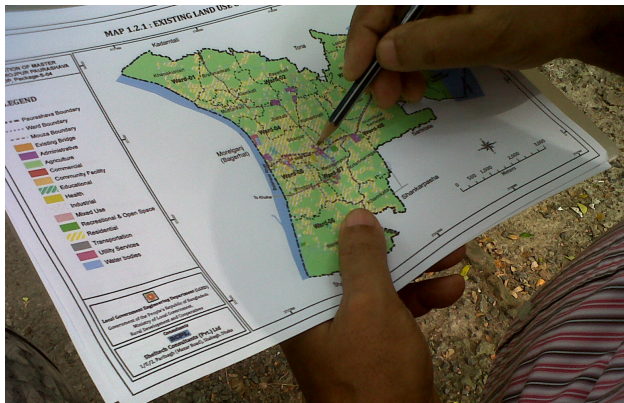
These are then translated into “human” vulnerability with a local economic normalizer, the “Income Equalisation Factor” (IEF). The tool thus gives developers a way to know how alternative “flood protection portfolios” result in impacts for the local community, while also offering a way to communicate these impacts to potential financiers and governmental bodies.

VRPM-Flood Defense does not replace the need for robust hydrological, engineering and economic analyses, but rather serves as a way of both integrating climate stresses into flood planning while also giving project developers a means of understanding the potential vulnerabilities and vulnerability reduction potential of alternative project designs and integrations.



VRPM-Flood Defense Key Inputs and Outputs

Project Scope	
INPUTS	OUTPUTS
Baseline property (residential/commercial) value and geospatial distribution	Baseline property value growth (taking into account current growth and economic trends without additional climate change)
Baseline density growth rate	
Community Income Equalisation Factor (IEF)	
Climate Drivers and Impacts	
INPUTS	OUTPUTS
Baseline (no climate change) flood distributions (20- and 100-year flood depths)	Baseline (no climate change) property value growth
Baseline impact parameters based on frequency-weighted flood depths (no climate change)	
Climate-change induced flood distributions (augmented 20- and 100-year flood depths)	Climate-change reduced property value growth
Impact parameters based on amended frequency-weighted flood depths (under climate change)	
Flood Defense Analysis	
INPUTS	OUTPUTS
Project Intervention Plan, including project capital and operating cost streams	Real project results in terms of restored property value growth
Impact parameters based on intervention to mitigate flooding impacts	Quantified climate change adaptation results denominated as capital (monetary) value and as a stream of Vulnerability Reduction Credits)



A Key for VRC Crediting and Project Finance

VRPM-FloodDefense offers projects a quantifiable economic approach to understand impacts and integrates a tool for quantifying projects using the Higher Ground Foundation's vulnerability reduction credit (VRC™) registration and issuance standards. VRCs can be the basis for project finance and budget planning, and could be an approach that governments, aid donors, and the UN Framework Convention on Climate Change's adaptation finance commitments could be tapped.

VRPM-FloodDefense is a tool offered by the Higher Ground Foundation, a UK-based NGO that produced the Vulnerability Reduction Credit mechanism. The Higher Ground Foundation is developing a standard for VRCs that is impartial, universal, and allows for comparison of different project types and even between different classes of climate vulnerability. **VRPM-FloodDefense** is one of the first Vulnerability Reduction Project Manager tools in development in addition to a **VRPMagPro™** – a tool under development for agricultural productivity protection in the face of climate changes, and other tools are in the planning stages. Together these constitute a growing system for comparing, prioritizing and crediting climate adaptation measures within and between sectors.

Why VRPM-Flood Defense for your organization?

VRPMUrbanFlooding is ready for beta testing.

We look forward to partnering with communities, project developers, and organisations looking to fund climate change adaptation. This cooperation could take many forms, for instance, project piloting or scaling up, developing test transactions, technical optimization work, etc.

Case Study

As the climate warms, increased rainfall and tidal surge results in enhanced urban flooding in a large coastal city in the tropics. Project Developers use **VRPM-FloodDefense** tool to evaluate and compare flood intervention measures in light of probability-weighted flood intensities. Factors to look at include:

- Discounted value stream of capital saved
- Discounted costs (CAPEX and OPEX)
- Implementation timeframe

Based on optimization of above factors (in terms of effectiveness and costs/benefits) flooding solutions are chosen. For example,

- Flood barriers/levees are constructed to protect most endangered neighbourhoods
- Existing drainage system extended and improved
- Green verges installed in town; upstream, mangrove fields are planted to cut erosion

Flooding solutions is implemented to protect community. As project unfolds, measures are monitored to ensure maintenance and usefulness and VRC credit streams are generated.

Talk to us to consider the ways we could work together to make urban areas flood resilient, and stand up to climate change. We'll be happy to demonstrate the **VRPM-FloodDefense** and explore the benefits of working together.

To Find Out More

The Higher Ground Foundation (*Higher Ground*) is the voluntary joint effort of a multi-disciplinary team with a proven track record of professional accomplishments and business successes. Our mission is to develop and manage the climate Vulnerability Reduction Credit (VRC™) a universal standard metric for the results of climate adaptation, in order to encourage more effective global climate resilience.

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