2011

**Los Quemados**

**Hydrologic Modeling**

**Justin Dye & Nathan Dye**

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# Understanding and Approach

The frequent floods of the Upper Yuna River Basin affect the city of Los Quemados, requiring evacuations before imminent floods. There are not any water regulation devices upstream of Los Quemados. The INDRHI has recently constructed retaining walls and has carried out work for determining channel suitability but it is still unknown how effective these will be.

If the time of concentration is really short for the basin, structural solutions appear to be the best. Other solutions include: dams to control flood waters upstream, including on the Yuna River itself; relocation of the city’s inhabitants; an emergency alert system which was suggested by the community.

There are essentially four parts to this flood study. First, all the needed maps, images, and data must be collected to create a computer model. Second, a model will be created and calibrated, showing the current conditions of the Yuna River Basin. Third, proposed solutions will be modeled and a comparative analysis of the solutions will be done. Finally, the results and conclusions will be summarized and presented to the group in charge in the Dominican Republic in the form of a report with recommendations.

# Project Team

Our team is comprised of two members: Justin Dye and Nathan Dye in addition we have a Faculty Mentor, and three correspondents in the Dominican Republic. The faculty advisor for this project is Dr. Jim Nelson. Fidel Perez is the Project Director in the DR and there will be three other correspondents in the Dominican Republic: Yudith Javier, Antonio Mendez, and Vladirmir Abreu. Our assignments and responsibilities are listed below for each team member, Figure 1.

Jim Nelson

Faculty Mentor

Arrange project

Review model

Professional insight

Justin Dye

BYU Graduate Student

Develop Proposal

Run the Hydraulic Model

Calibrate the Model

Write the report

Vladirmir Abreu

Colleague of Fidel Perez

Data acquisition

Field visits

Help with modeling

Antonio Mendez

Colleague of Fidel Perez

Data acquisition

Field visits

Help with modeling

Nathan Dye

BYU Senior

Develop Proposal

Run the Hydraulic Model

Calibrate the Model

Write the report

Fidel Perez

Project Director

Provide data & information

Oversee project progression

Ensure

Yudith Javier

Colleague of Fidel Perez

Data acquisition

Field visits

Help with modeling

*Figure 1 – Team organizational chart and responsibilities.*

## Team Experience and References

### Justin Dye

With Justin’s interest in emphasizing his career in water resources, he has taken all of the necessary courses that prepare him to gain a solid background and knowledge for this discipline. He completed his Bachelor’s degree in December 2010, and is currently continuing his education as a graduate student. His advanced coursework includes Fluid Flow Theory, Hydraulic Engineering, Hydrology, Principles of Hydrologic Modeling, and Engineering Applications of GIS. He has worked in the construction industry for seven years and understands how projects are planned and completed effectively.

### Nathan Dye

Nathan is emphasizing his studies in water resources. He has taken courses which give him the knowledge and experience to begin working on projects in this discipline. His coursework includes Hydraulics and Fluid Flow Theory, Hydraulic Engineering, Hydrology, and Principles of Hydrologic Modeling. He has also worked at Aquaveo doing technical support for the WMS software for the past two years.

# Scope of Work and Schedule

## The work to be preformed is as follows

* Gather basin images and maps
* Obtain meteorological data and analyze basin characteristics
* Obtain data gathered from field work
* Develop WMS and GSSHA Models
* Calibrate the models
* Carry out simulations for proposed structural improvements
* Carry out simulations for proposed non-structural improvements
* Comparative analysis of the improvements
* Provide results and recommendations

### Gather Basin Images and Maps

The images and maps of the basin will obtained through Fidel Perez or the other three people, Antonio Mendez, Vladirmir Abreu, or Yudith Javier involved in this project. The map data will include a digital elevation map or a better resolution DEM than we currently have.

### Obtain Meteorological Data and Analyze Basin Characteristics

Meteorological data will be obtained from Fidel Perez or the others. We will use this data in WMS to determine some of the characteristics of the basin.

### Obtain Data Gathered From Performed Field Work

Our correspondents will visit the site and perform field work during the month of February. We will obtain this data from them. Data might include reservoir and river measurements, updated site information, and corrections to the current data.

### Develop WMS and GSSHA Models

A baseline model will be constructed for the upper Yuna River basin.

### Calibrate the Models

The WMS and GSSHA models will be calibrated in order more correctly predict changes that will occur in the basin by implementing flood remedies.

### Run Simulations for Proposed Structural Improvements

Impact studies will be done for the proposed integration of structural improvements.

### Run Simulations for Proposed Non-Structural Improvements

Impact studies will be done for the proposed integration of non-structural improvements.

### Comparative Analysis of Improvements

An analysis of suggested improvements will be done to weigh the costs and benefits of implementing structural and/or non-structural remedies.

### Provide Results and Recommendations

The results of study for the Yuna River Basin, and the city Los Quemados will be reported along with recommendations for solving the current flood problems.

## Schedule

*Table 1: Flood Remedies for Los Quemados*



# Cost Proposal

The following table estimates the cost of the study.

