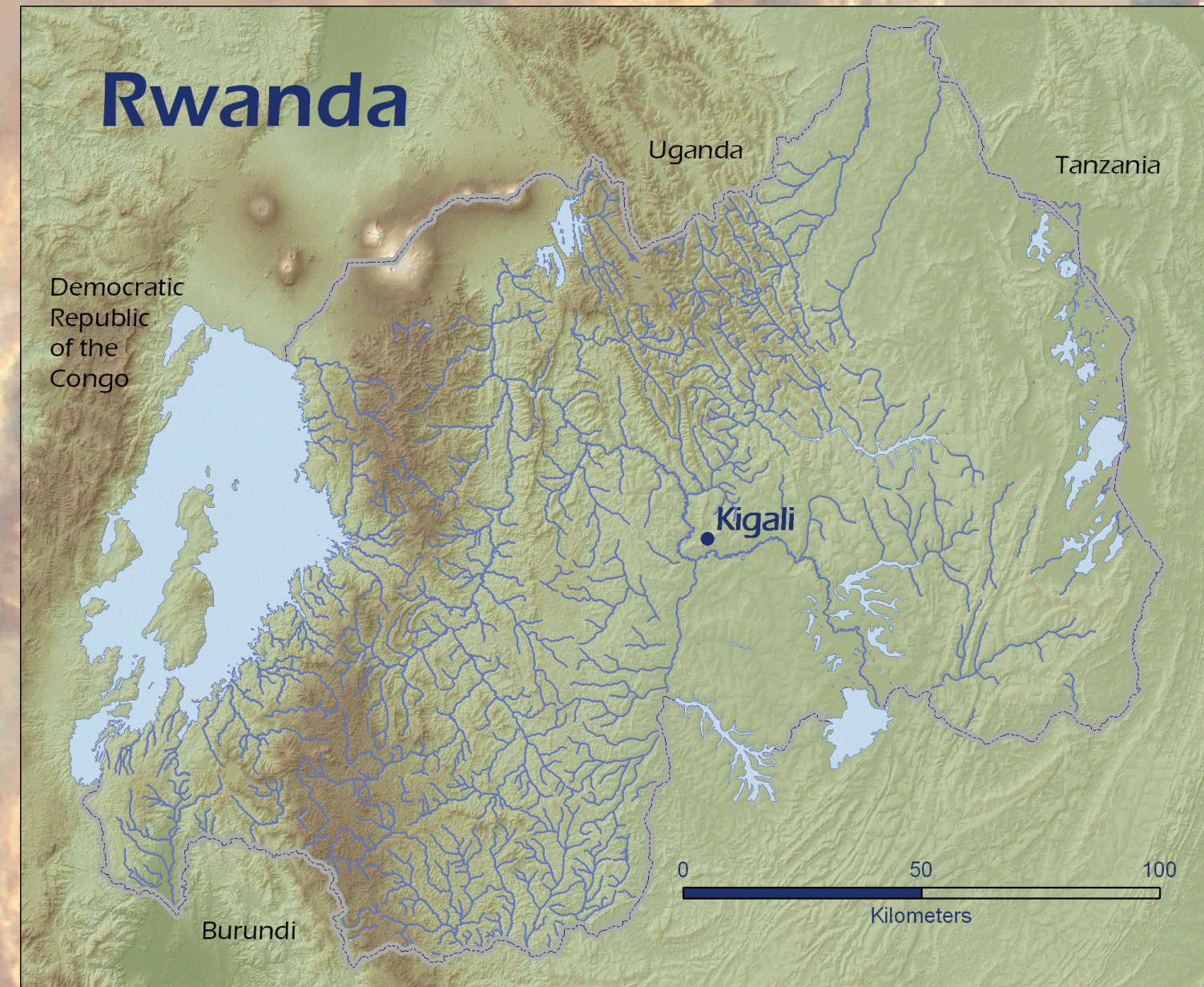


Mille Collines: Land of a Thousand Hills



Central Rwanda: hilly plateau
 - 1,700 m/5,600 ft elevation
 East: towards Tanzania, lowest point in country
 - 950 m/3,116 ft
 West: mountains elevation average 2,740 m/9,000 ft
 - Drainage divide between the Nile and Congo river systems
 Virunga Mountains (volcanic range) to the north
 - Highest peak Volcan Karisimbi (4,507 m/14,787 ft)



The Genocide

Nearly 1 million people killed in the 100 day genocide
 - A viciously planned and executed strategy of the Interahamwe (radical Hutu militia) to rid country of Tutsi and moderate Hutu.
 April 6, 1994, then (Hutu) President Habyarimana's plane was shot down
 - Violence began immediately; continued until July 18, 1994, when Tutsi-led rebel army, the Rwandan Patriotic Front, claimed victory
 Approximately 11 percent of Rwanda's total population were killed
 - Mostly Tutsi (75% of the population) & moderate Hutu
 About 135,000 Rwandan civilians implicated in genocide
 - Tribunals are still processing the accused
 - Estimates up to 2 million may have participated



Population Pressures

10 million people, 26.3 square kilometers
 - Slightly larger than Vermont, pop. 625,000
 - Slightly smaller than Mass., pop. 6.4 million
 Total Fertility rate, 5.4 (US 2.1 / Italy 1.3)
 Pop. Growth rate 2.76% and rising (21st in world)
 2025 pop. projection is 16 million
 Life expectancy at birth, 48
 60 percent of population below poverty line
 80 % of land under cultivation
 90 % of population subsistence agriculture
 Annual income 250 US dollars, 133,750 rwf



Millennium Villages Project

12 villages in 10 African countries (Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania and Uganda)
 Goal to demonstrate how eight (UN) Millennium Development Goals (MDGs) can be met in rural African within five years, through community-led development
 NGOs, national governments and communities working together to access proven and powerful technologies to enhance farm productivity, health, education and access to markets

CARTE D'AFRIQUE

GIS Database Development and Analysis of Public Access to Water Sources in the Mayange Sector of Rwanda

ABSTRACT

The University of Redlands' Environmental Studies and MS GIS Programs – in partnership with the Millennium Villages Project (MVP) and the Centre for Geographic Information Systems at the National University of Rwanda (CGIS NUR) – are using Geographic Information System (GIS) and Global Positioning System (GPS) technologies to compile a database and study characteristics associated with community access to available water supply in the Mayange sector of Rwanda. The project team digitized water access point locations and explored spatial dimensions of land use characteristics associated with water quality and quantity, with plans to model data and support more effective diagnoses of problems with existing public water sources. Water access points were located using GPS, and water usage characteristics were surveyed via personal interview at each site. Collected field data was added to a regional database composed of environmental and governmental GIS data layers provided by MVP and CGIS NUR. Geographic characteristics associated with good water sources are used to determine suitability as a water access point. A spatial model outputting information regarding access to good quality water will be developed using collected and previously available spatial data. Anticipated model results will be output as a statistical surface revealing relative suitability of all locations in terms of potential for water access throughout the region. The model will allow the team to better diagnose problems at lower quality sites and to identify new areas that may prove to be suitable locations for water source improvement projects. Additional GIS services were provided to MVP while in the field, extending the original project objectives to include boundary mapping as well as a more complete spatial data inventory than was previously available. Furthermore, collaborative relationships between MVP and CGIS NUR were initiated as a byproduct of project team efforts, establishing additional goals to provide GIS software and training to MVP staff.

R. Maxwell Baber, Ph.D.
MS GIS Program
Katherine Noble-Goodman
Environmental Studies
University of Redlands
Redlands, California

Ongoing Agenda

- Water access project
- Spatial data editing and database management
- Geographic analyses and spatial modeling
- Millennium Villages Project
- Access to GIS software and staff training
- Develop comprehensive spatial data infrastructure
- Explore spatial dimensions of public health issues
- Collaborative partnerships
- NUR Centre for Geographic Information Systems
- Millennium Villages Project
- Loma Linda University
- GIS and service to developing world

Water in Developing World



Millennium Development Goals include reducing by half the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015
 Sub-Saharan Africa greatest challenge. From 1990-2004, number of people without access to safe drinking water increased by 23 percent
 Almost half of population in the global south has water-related disease, the most common of which are diarrhea and intestinal parasites
 88 percent of diarrhea-related disease – the 2nd leading cause of death in children under five – is caused by unsafe drinking water, inadequate sanitation and poor hygiene.

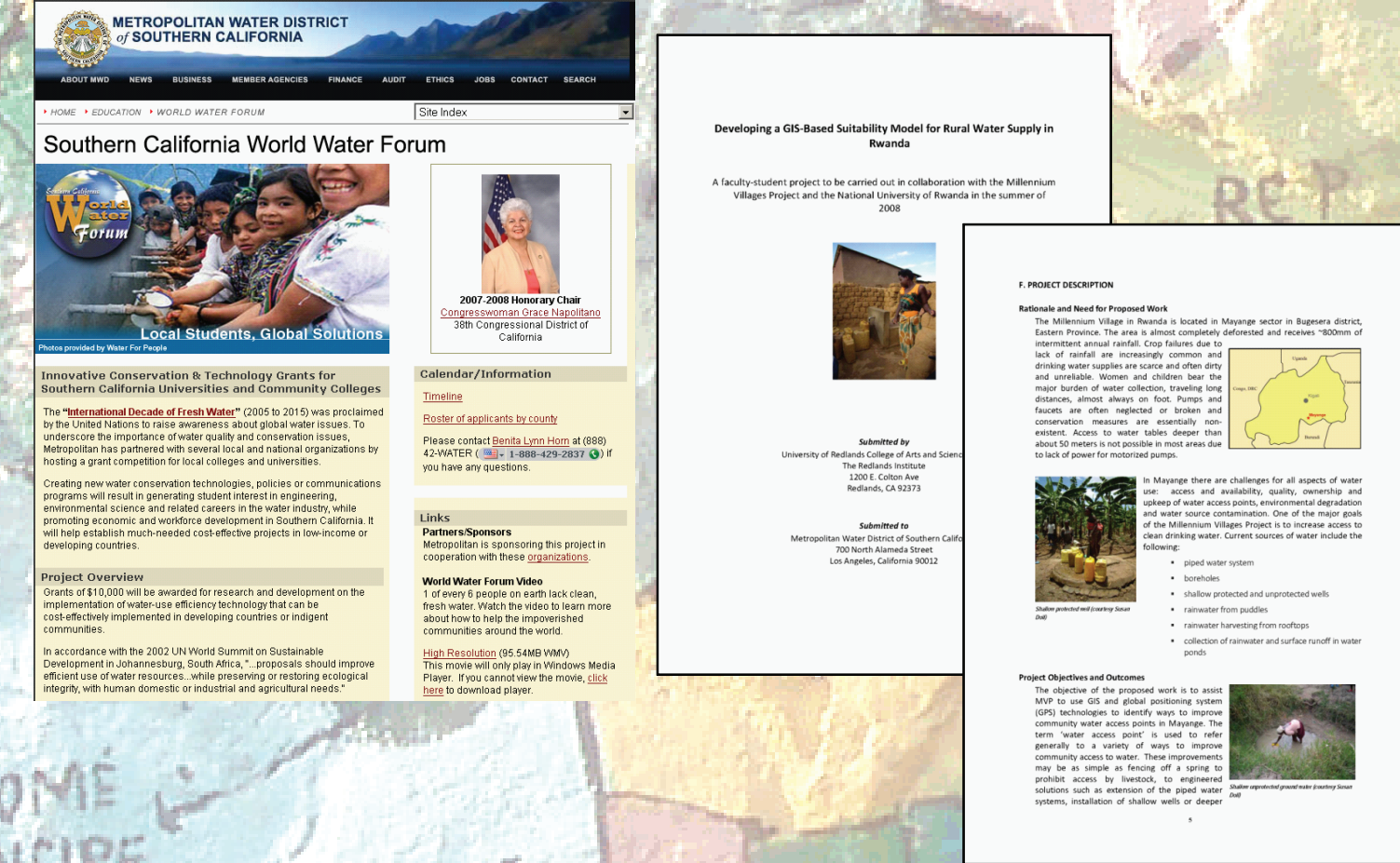


Mayange, Rwanda: A Millennium Village

One of poorest regions in Rwanda, located in the Bugesera district, 23 km south of Kigali
 Sector population is 25,000
 Program started in 2006
 Initial focus on improving health center, schools and agriculture and small business enterprise
 - Clinic had no running water, electricity, inadequate nursing staff, no medicines or equipment
 - Improved seeds and fertilizers, construction of small reservoirs to irrigate cash crops such as pomegranates and chickpeas (qualify this)
 - Small basket weaving program to generate income
 - Model school with electricity, a few computers.



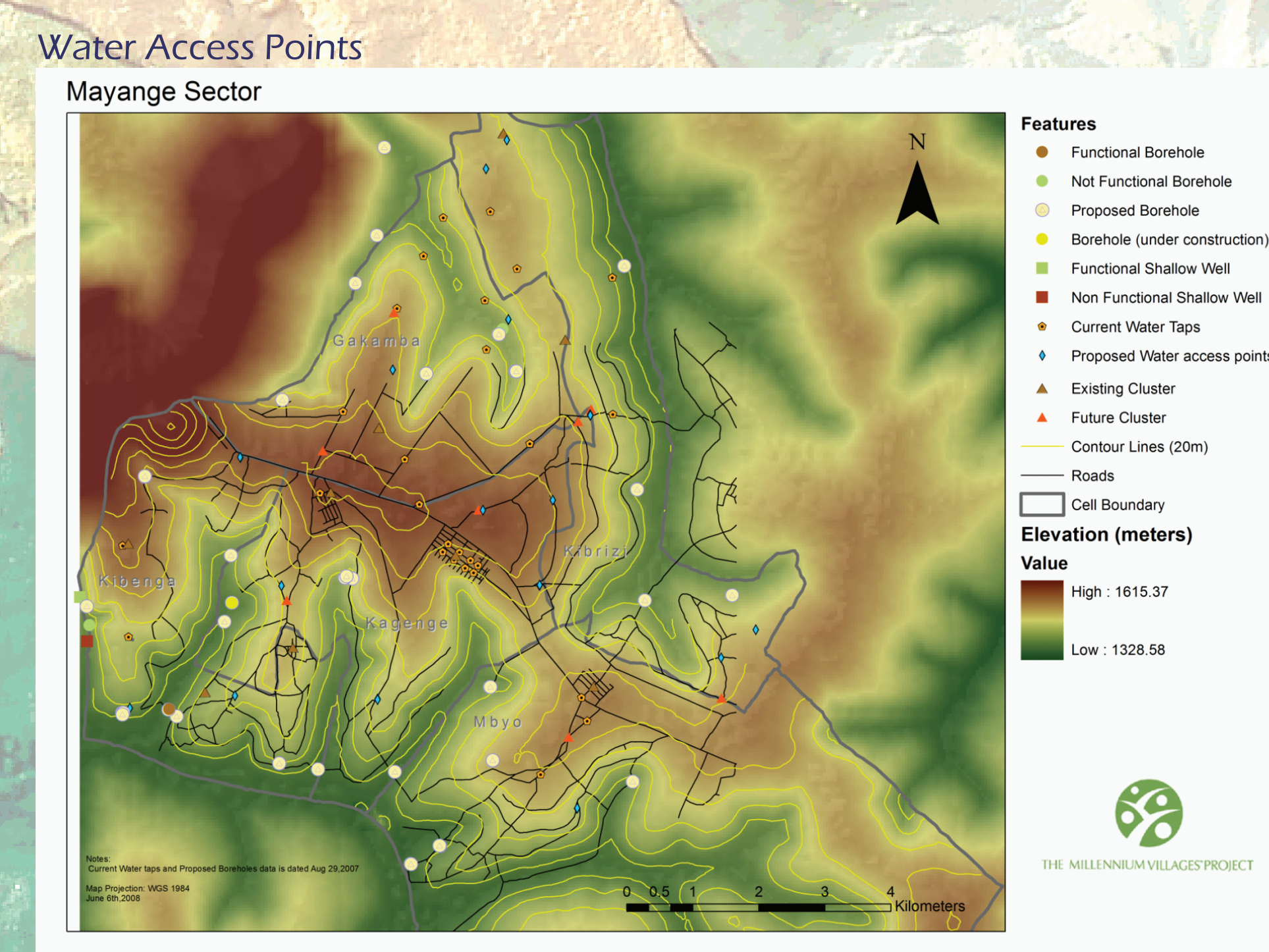
"World Water Forum" Proposal



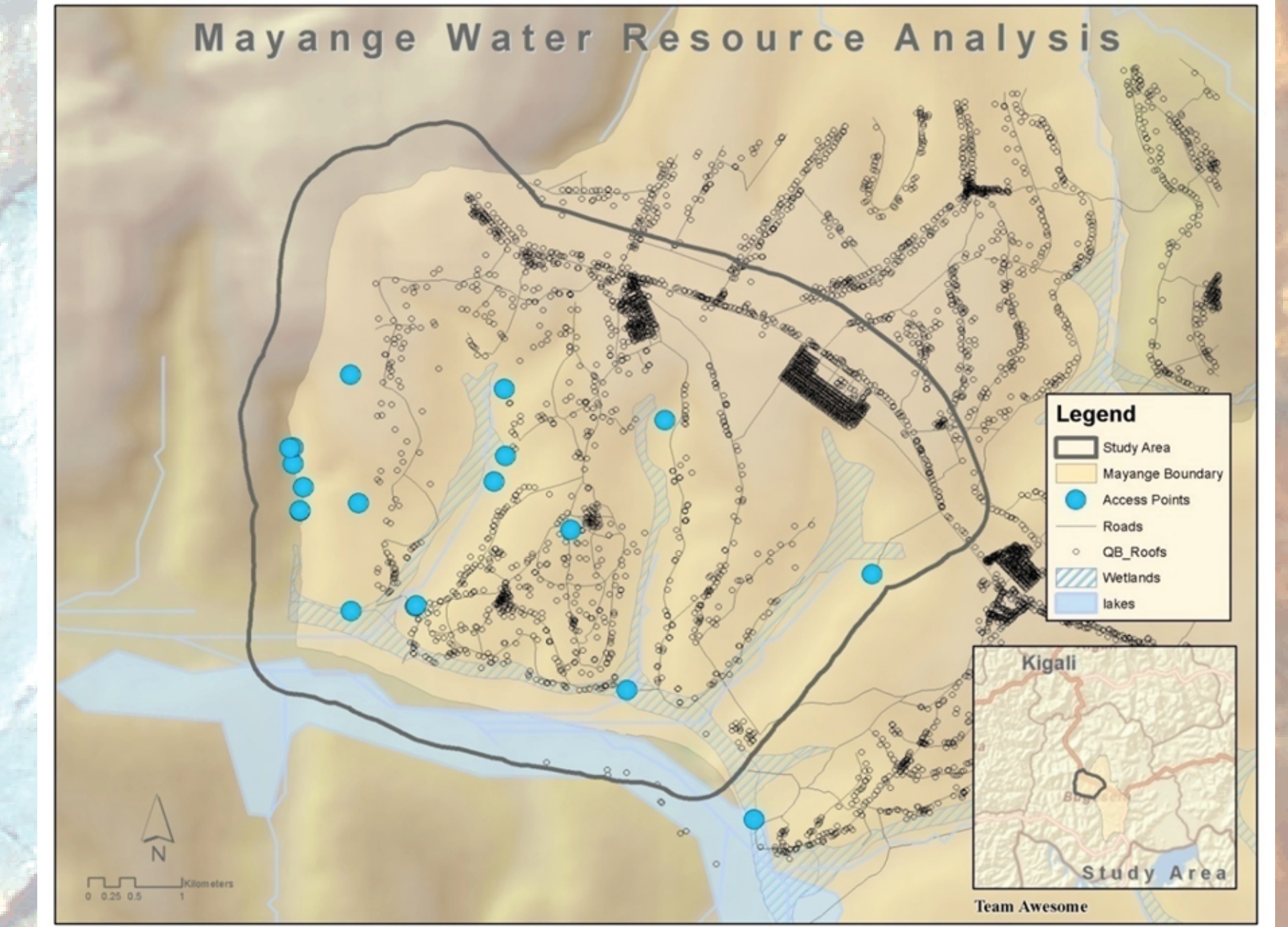
Mayange Water Access Points



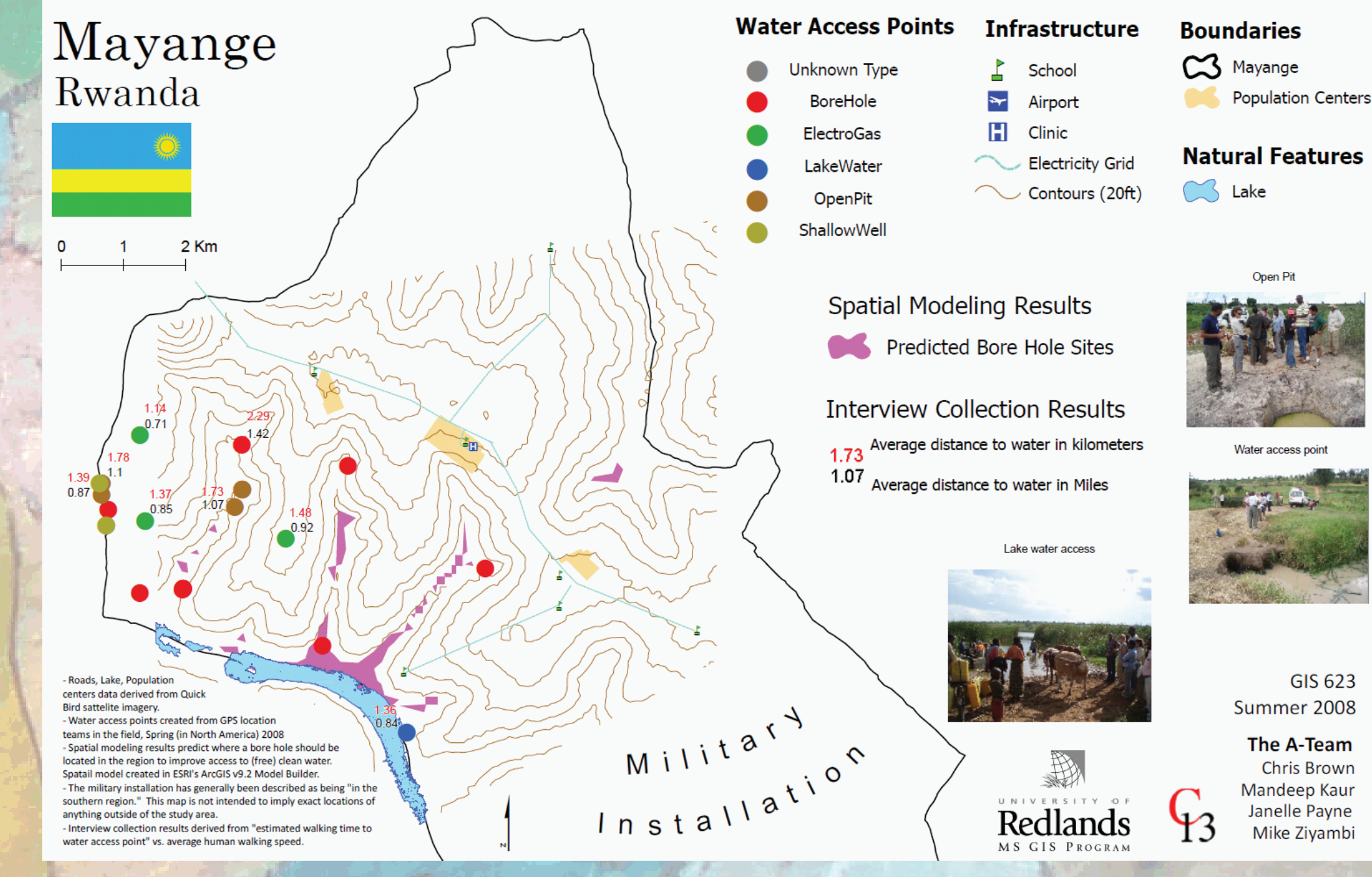
Student Maps of Study Area



Study Area Features



Model Results



Housing Density

