MAPPING ACEQUIAS

A COLLABORATIVE COURSE DESIGNED BY:
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ALBUQUERQUE, NEW MEXICO - SUMMER 2008

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INTRODUCTION

COMMUNITY COLLABORATION

DESCRIBED WITHIN THIS DOCUMENT IS A PILOT COURSE THAT RESULTED FROM OUR COLLABORATION WITH LOCAL COMMUNITIES IN AN EFFORT TO START A GEOGRAPHIC INFORMATION SYSTEM THAT MANAGES DATA RELATED TO WATER MANAGMENT, SPECIFICALLY ACEQUIA MANAGEMENT AND MAINTENANCE. THE DESCRIPTION INCLUDES THE COURSE ITSELF AS WELL AS ITS PREPARATORY WORK.

Participatory Research and its many forms:

- Community based (in-house) GIS
- University - Community partnerships
- Publicly accessible GIS facilities at universities and libraries
- Map rooms
- Internet map servers
- Neighborhood GIS centers

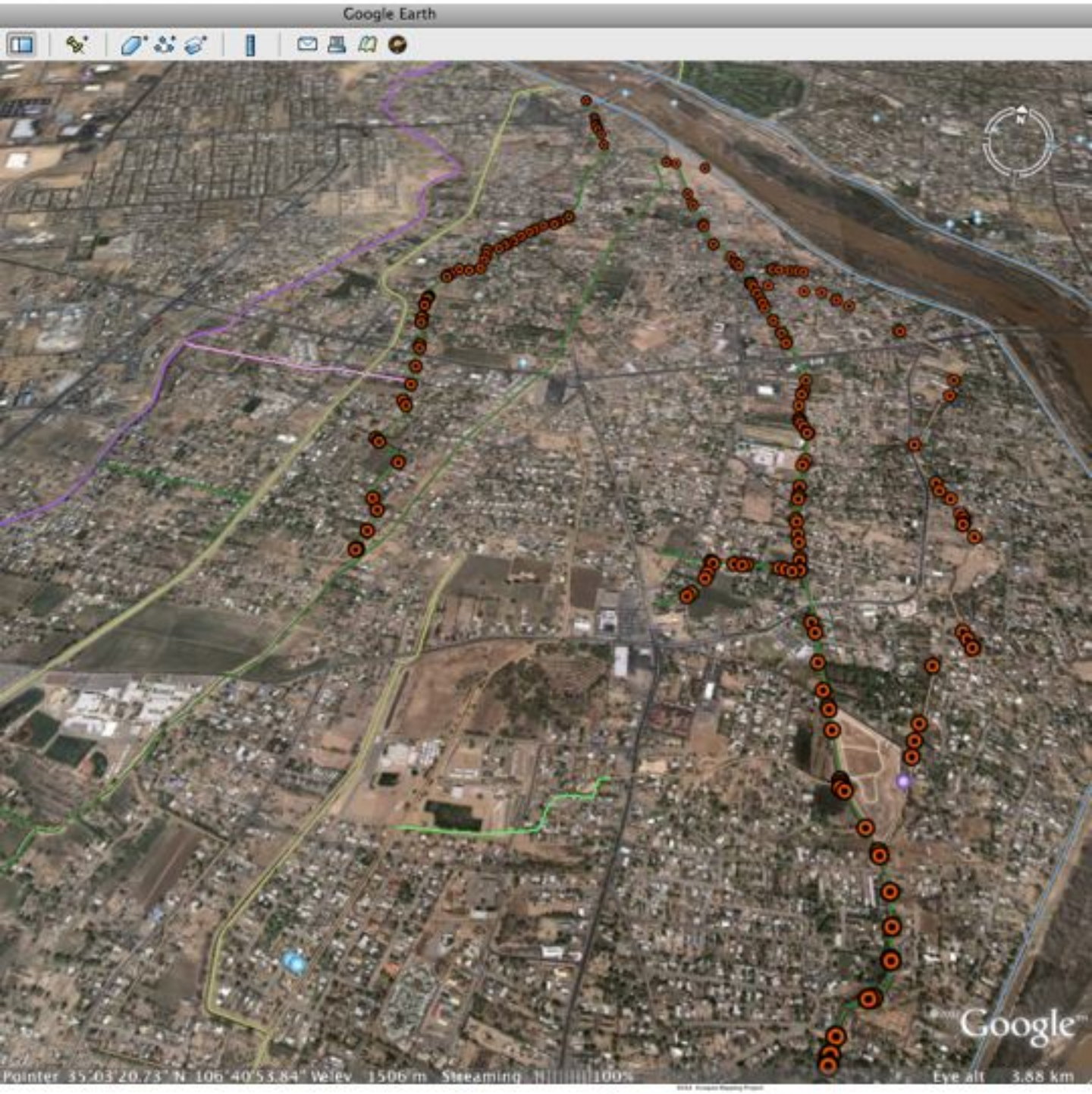
THE ABOVE LIST FROM CRAIG ET.AL., 2000 SHOWS A HIERARCHY IN

PARTICIPATORY RESEARCH. CURRENTLY, THIS PROJECT FALLS WITHIN THE SECOND CATEGORY, THE INTENT OF THE LOCAL COMMUNITY IS TO EVENTUALLY HAVE AN COMMUNITY BASED GIS. TRAINING PROVIDED THROUGH OUR CURRENT EFFORTS IS MEANT TO BE A STEP IN THAT DIRECTION. IN ADDITION TO GATHERING DATA AND CREATING MAPS, OUR FOCUS IS ALSO DIRECTED TOWARD THE CREATION OF USER-FRIENDLY COMMUNITY TOOLS, SUCH AS THE USE OF GOOGLE EARTH.

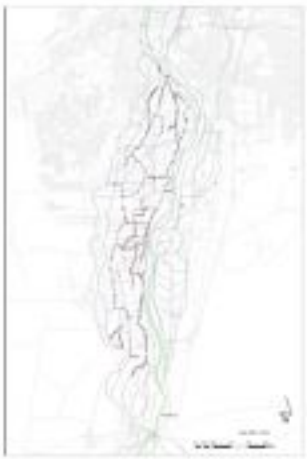
THE COURSE DESCRIBED IN THIS DOCUMENT TOOK PLACE DURING THE SUMMER OF 2008. THE OBJECTIVE OF THE COURSE WAS TO PROVIDE TRADITIONAL STUDENTS AS WELL AS NON-TRADITIONAL STUDENTS (COMMUNITY MEMBERS) WITH TRAINING IN DATA COLLECTION BY MEANS OF GPS AS WELL AS INTEGRATING THOSE DATA IN A GIS. THE GEOSPATIAL TRAINING WAS FRAMED WITHIN COMMUNITY MAPPING EFFORTS.

THE COURSE WAS DESIGNED FOR STUDENTS WITH VARYING LEVELS OF GEOSPATIAL EXPERTISE. THIS WAS BASED ON OUR ASSUMPTION THAT THOSE STUDENTS WITH MORE -TECHNICAL- GEOSPATIAL KNOWLEDGE WOULD COMPLEMENT THOSE WITH MORE -CONTENT- KNOWLEDGE REGARDING THE ACEQUIAS.

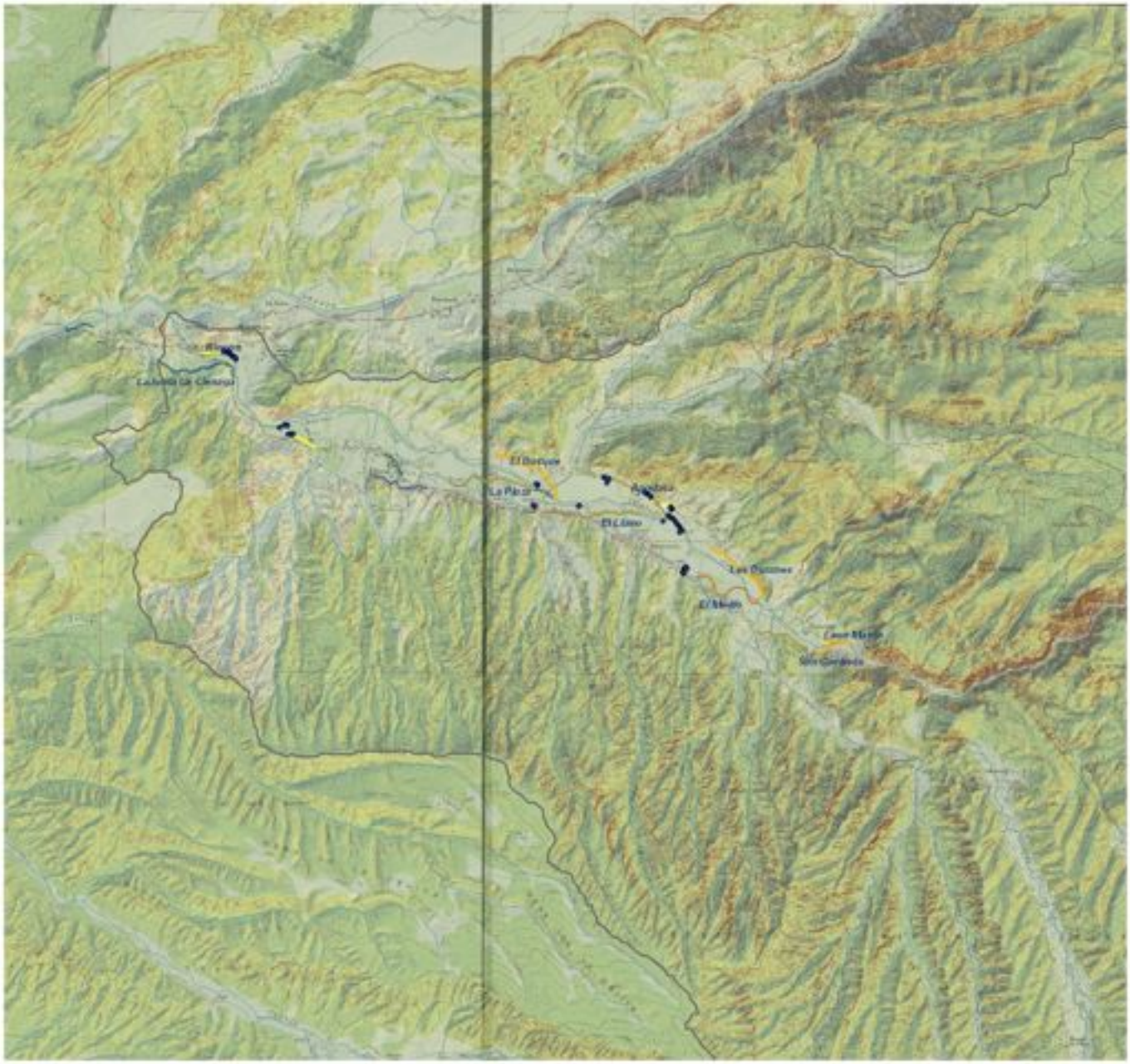
A TOTAL OF 12 STUDENTS IN THE CLASS CAME FROM MIXED BACKGROUNDS AND VARYING LEVELS OF CONTENT AND TECHNICAL EXPERTISE.



SOUTH VALLEY

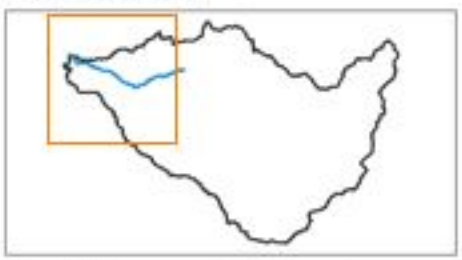


Acequia Madres

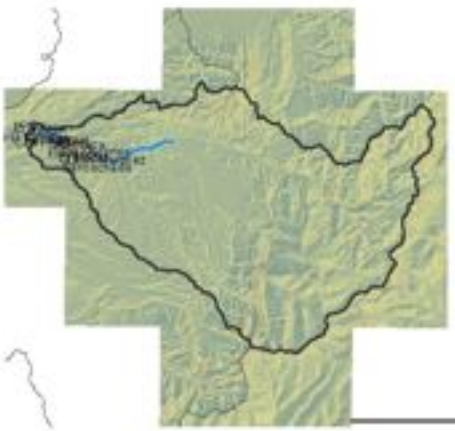


0 0.35 0.7 1.4 2.1 2.8 Miles

Embudo Watershed



0 5 10 20 30 40 Miles



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THEORY AND PRACTICE

THE FOLLOWING ISSUES IN PARTICIPATORY GIS PROJECTS ARE DEFINED BY CRAIG ET.AL. 2000:

differential access to geographic information technology

integration and representation of multiple realties of landscape within a GIS

Identification of the potential beneficiaries of participatory GIS projects

Development of place-based methodologies for more inclusive community participation

Situating a Participatory GIS (PPGIS) production and implementation in its local political context

Identification of community GIS contributions to Geography and Science

THE PILOT COURSE AND ITS PREPARATORY WORK DESCRIBED IN THIS DOCUMENT IS BASED ON COMMUNITY IDENTIFIED NEEDS. THE TWO DIFFERENT ACEQUIA COMMUNITIES, THE SOUTH VALLEY ACEQUIA COMMUNITY AND THE EMBUDO VALLEY ACEQUIA COMMUNITY, WHICH ARE PART OF THIS COLLABORATIVE EFFORT. BOTH HAVE DEFINED MAPPING NEEDS BASED ON THEIR UNIQUE SITUATIONS. IN THE SOUTH VALLEY AN IMMEDIATE CONCERN IS THE ADJUDICATION PROCESS THAT WILL START IN 2009. IN EMBUDO THIS PROCESS IS NOT PRESSING, LOSS OF CULTURAL KNOWLEDGE AND TRADITIONAL IRRIGATION PRACTICES IS OF PRIMARY CONCERN.

IN PRACTICE THIS HAS LED US TO FOCUS ON DIFFERENCES IN THE DATA THAT NEED TO BE COLLECTED, RESULTING IN A DATA DICTIONARY THAT NEEDS TO BE FLEXIBLE, AND A GIS THAT NEEDS TO ACCOMODATE BOTH STATE LAW AND ACEQUIA LAW CRITERIA.

WATER

In New Mexico, water has always been a scarce and precious resource. Demands to move water out of traditional communities to industry, sprawling cities, and commercial uses that are often viewed as 'higher economic uses' threaten the survival of traditional water management systems, such as *acequias*, and the water security of historic, agricultural communities in New Mexico. (New Mexico Acequia Association) *.

Acequias are the historic communal irrigation systems that support the culture and livelihood of many families in New Mexico. THE SYSTEM IS BASED ON WATER SHARING PRACTICES, WHICH INCLUDES SHARED LABOR SUCH AS THE PRACTICE OF SPRING CLEANING. THE DITCHES ARE COMMUNAL, WHICH MEANS THAT ACCESS FOR CLEANING IS A RIGHT, SO-CALLED EASEMENT. IN ADDITION, WATER THAT IS NOT BEING USED BY ONE PARCIANTE, OR LANDOWNER, CAN BE 'BANKED' TO BE USED BY OTHERS ON THE DITCH

According to the laws of the Indies, indigenous communities and *acequia* communities have the oldest and primary water-rights in the state, the case study is focused on the *acequia* communities. However, due to the commercial demand for water these rights are currently contested. Water rights are under review and adjudication processes are under way. What this means for traditional water use is that every person claiming ancient water rights needs to prove that he/she is indeed in need of water for beneficial use, at present, but more importantly that this was true in the past, tested at certain benchmark dates. Failure to provide the necessary documentation in this adjudication process can lead to loss of water-rights, rights that will subsequently go to the highest bidder.

THE COURSE IS FOCUSED ON PROVIDING TRAINING, TOOLS, AND DATA TO NEW MEXICO COMMUNITIES AND IS FRAMED BY THE CRITERIA USED IN THE WATER ADJUDICATION PROCESS AS WELL AS BY ACEQUIA LAW

*www.lasacequias.org

CASE STUDY

ACEQUIA COMMUNITIES IN NEW MEXICO

An *acequia* is both a physical irrigation ditch and a community of people or *parciantes* who own water rights distributed by the irrigation ditch and who operate the ditch for their own benefit and good.

Acequias, also called community ditch associations, are political subdivisions in New Mexico.

Acequias have existed for centuries, most were implemented during the 17th and 18th century during Spanish and Mexican administration,immediately following the land grant establishments. During that time local courts resolved water disputes; the concept and process of general stream adjudication is relatively new, first appearing in the 1907 WATER CODE.

The TREATY OF HIDALGO 1848 - states that the U.S. agreed to protect rights recognized by sovereigns of Spain and Mexico, including land grants and water rights.

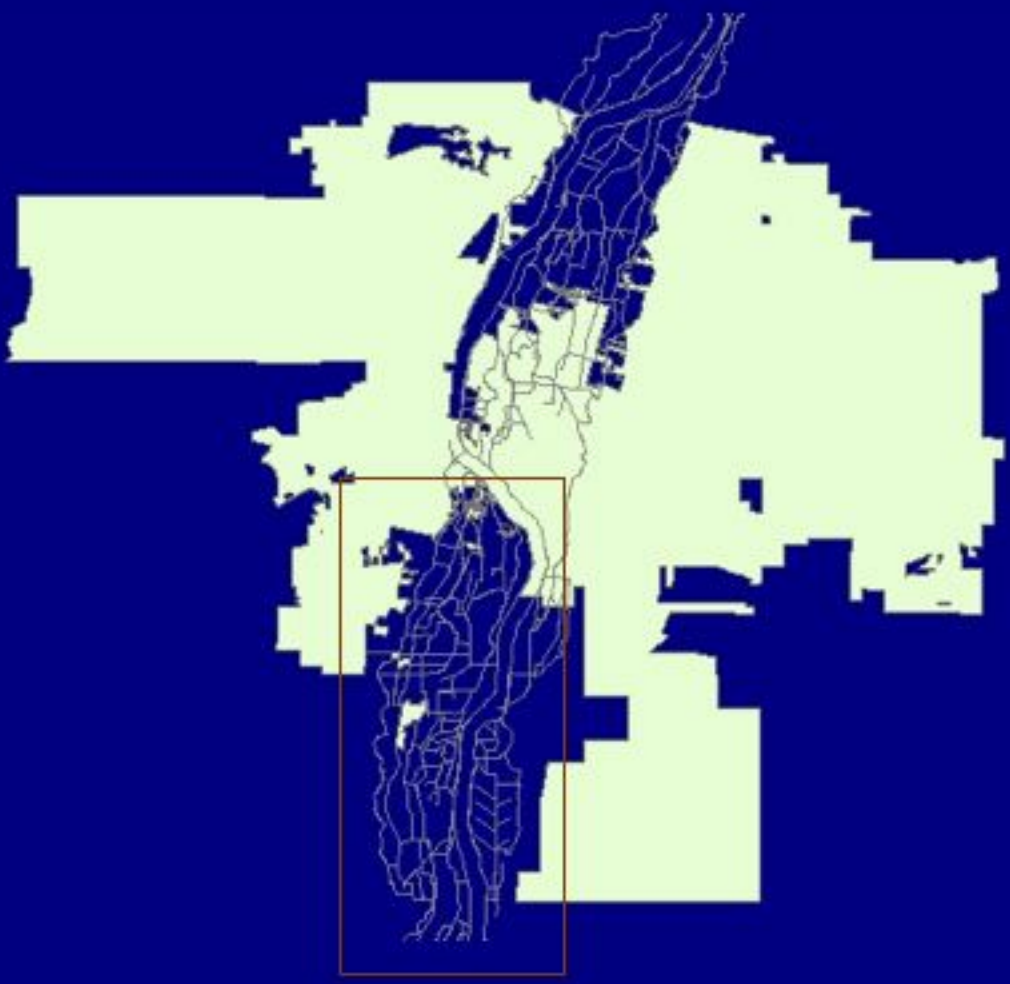
The challenge that *acequias* and tribal communities face today is for the adjudication courts to properly describe the water rights of their members and protect water sharing customs.

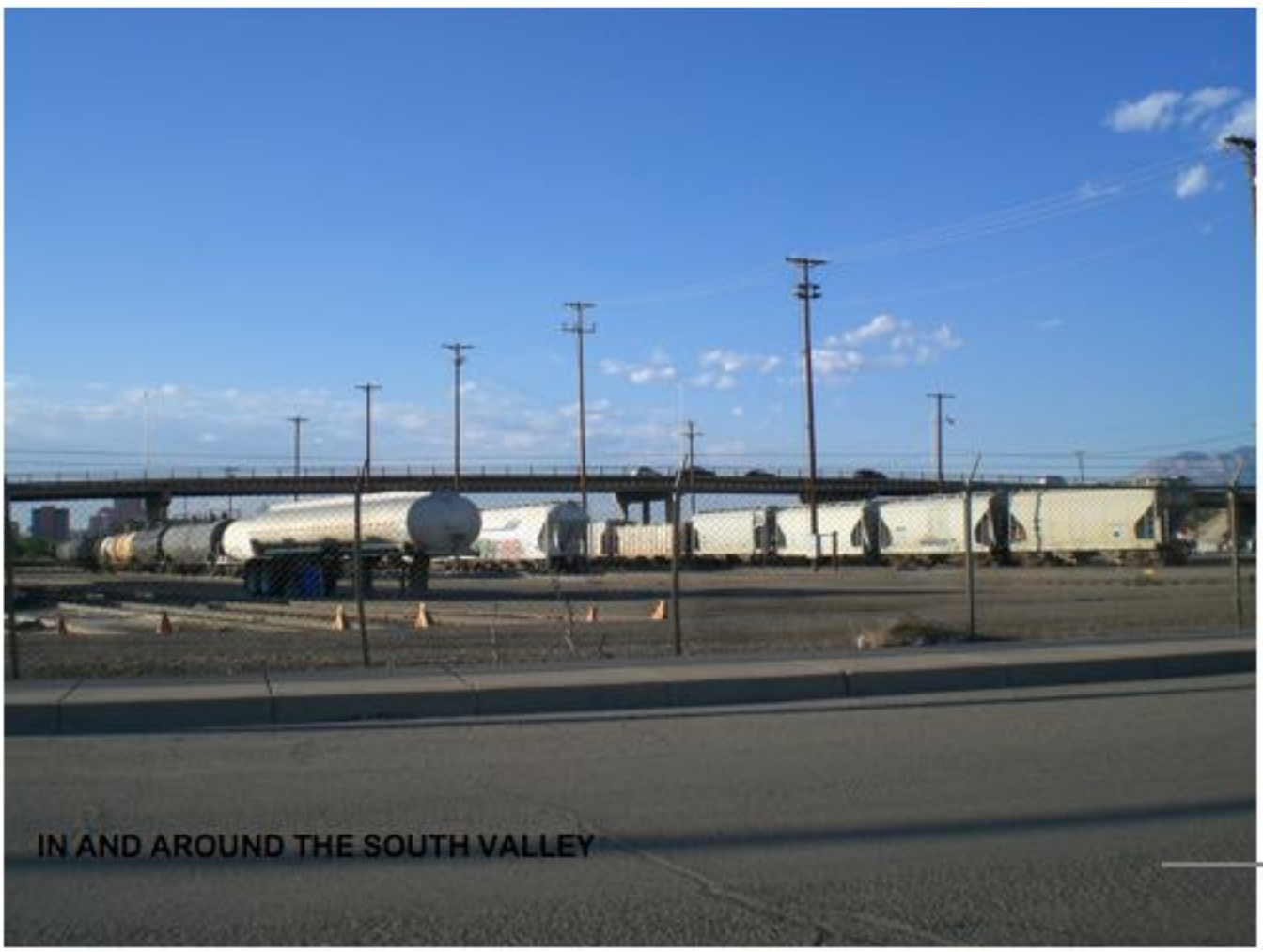
www.lasacequias.org

CONVENTIONAL THINKING ADVOCATES URBAN EXPANSION WITH WATER DERIVED FROM PREVIOUSLY ALLOCATED AGRICULTURAL SOURCES

A 1997 STUDY BY THE BUREAU OF RECLAMATION OF THE ALBUQUERQUE BASINFOUND THAT **50%** OF GROUNDWATER RECHARGE OCCURS THROUGH FLOOD IRRIGATION AND SEEPAGE FROM CANALS AND DRAINS THAT PARALLEL THE RIVER.

SOUTH VALLEY





IN AND AROUND THE SOUTH VALLEY

THE URBAN SETTING

THE SOUTH VALLEY IS CHARACTERIZED BY URBAN DENSITY YET A RURAL LIFESTYLE. THE AREA IS KNOWN FOR ITS RICH HISTORY WHICH INCLUDES LARGE PUEBLOAN SETTLEMENTS. THE LANDUSE PATTERN THAT IS STILL SEEN TODAY BEGAN WITH THE LANDGRANT COMMUNITIES THAT WERE FOUNDED DURING THE LATE 17TH AND 18TH CENTURIES. FOR CENTURIES THE ACEQUIA SYSTEM THAT IRRIGATED THE FLOODPLAIN OF THE RIO GRANDE WAS TRADITIONALLY MANAGED. CHANGES WERE INTRODUCED DURING THE 1930'S WHEN A NUMBER OF ACEQUIA COMMUNITIES WERE RE-ORGANIZED IN THE MIDDLE RIO GRANDE (MRGCD) CONSERVANCY DISTRICT. EVEN THOUGH THE OBJECTIVES OF THE MRGCD ARE SIMILAR TO TRADITIONAL ACEQUIA PRACTICES, CERTAIN TENSIONS EXISTS BETWEEN THE MRGCD AND THE SOUTH VALLEY ACEQUIA ASSOCIATION, WHICH IS BASED ON TRADITIONAL VALUES

POPULATION:
39,060
AREA:
39 MI^2

COUNTY:
BERNALILLO, NM
LANDGRANTS:
ATRISCO;
PAJARITO;
LOS PADILLAS

EL AGUA ES VIDA






EMBUDO VALLEY

THE RURAL SETTING

THE EMBUDO VALLEY IS LOCATED IN THE UPPER RIO GRANDE REGION IN NORTHERN NEW MEXICO AND THE ORIGINAL EMBUDO LANDGRANT ENCOMPASSES 25,000 ACRES. THE EMBUDO CREEK (RIO EMBUDO) WHICH FEEDS THE ACEQUIA SYSTEM IN THE VALLEY IS A TRIBUTARY OF THE RIO GRANDE RIVER. THE EMBUDO VALLEY ACEQUIA SYSTEM CURRENTLY COUNTS 10 ACEQUIA MADRES, 5 ON EACH SIDE OF THE RIO EMBUDO. EACH ACEQUIA MADRE IS MANAGED BY ONE MAYORDOMO, OR DITCH BOSS, AND 3 COMMISIONADOS TRADITIONALLY. THE SCALE IS ALSO DIFFERENT THAN THE SOUTH VALLEY ACEQUIAS. EACH OF THE 10 DITCHES ALONG THE EMBUDO CREEK HAS ITS OWN *PRESA* OR DIVERSION DAM AND *DESAGÜE*, OR DRAINAGE PIPE, WHEREAS IN THE SOUTH VALLEY SYSTEM, THE DIVERSION DAM IS LOCATED APPROXIMATELY 25 MILES UPSTREAM AT ALGODONES, NEW MEXICO.

POPULATION:

TODAY **ABOUT 1500**

YEAR 1934 **1195**

LANDGRANT:

EMBUDO LANDGRANT (NOT CERTIFIED)

COMMUNITIES: CIENEGA; RINCONADA; DIXON; APODACA; CAÑONCITO

CELEBRANDO LAS ACEQUIAS






COURSE PREPARATION

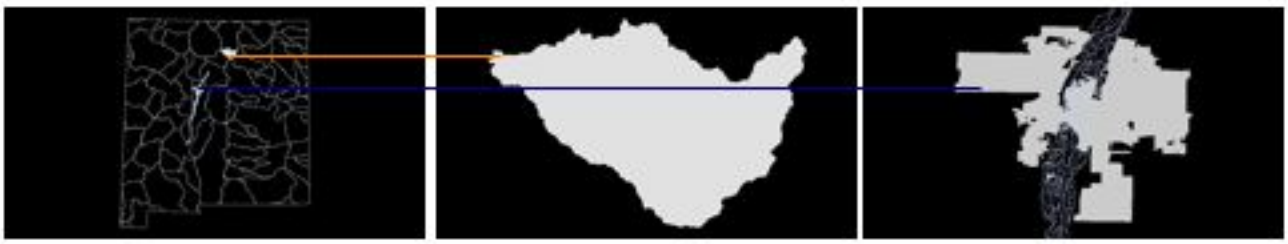
FIELD VISITS

THE PURPOSE OF THE FIELD VISITS WAS TO GET A GENERAL IDEA OF THE SPATIAL ORGANIZATION OF THE ACEQUIAS,ITS PHYSICAL FEATURES AS WELL AS CULTURAL ASPECTS.IN ADDITION TO OUR FIELD VISITS, WE HAD SEVERAL MEETINGS WITH OUR CONTACT PERSONS.
DURING OUR FIELDVISITS WE DID SOME RECONNAISSANCE AND COLLECTED SOME GPS DATA. WE ALSO MET WITH SOME OF THE MAYORDOMOS WHO GUIDED US ALONG THEIR ACEQUIA.SLOWLY WE BEGAN TO UNDERSTAND THE COMPLEXITY OF THE SYSTEM AND THE DIFFERENCES BETWEEN THE DIFFERENT ACEQUIA COMMUNITIES.
ANOTHER GOAL OF OUR FIELD VISITS WAS TO GET AN IDEA HOW MUCH OF THE SYSTEM COULD BE MAPPED DURING THE SUMMER COURSE BY OUR STUDENTS AND THE LOGISTICS INVOLVED.

WE CONDUCTED THREE MAIN FIELD VISITS, TWO TO EMBUDO AND ONE TO THE SOUTH VALLEY. IN THE SOUTH VALLEY WE ALSO HAD A NUMBER OF INFORMAL MEETINGS DISCUSSING THE MAPPING OF THE ACEQUIAS.

APRIL 5 & 6	EMBUDO
JUNE 8	EMBUDO
JULY 12	SOUTH VALLEY

IN ADDITION TO FIELD VISITS AND THE DATA WE COLLECTED IN THE FIELD WE ALSO ORGANIZED AVAILABLE GEOSPATIAL DATA RELEVANT FOR THE STUDY AREAS WITHIN A GIS AS WELL AS SCANNED ANALOG MAPS, SUCH AS HISTORIC LAND GRANT AND ASSESSOR MAPS.



SATURDAY & SUNDAY APRIL 5-6

OUR FIRST FIELDVISIT. ESTEVAN ARELLANO SHOWED US THE VALLEY AND ITS IMPORTANT ACEQUIA FEATURES, SUCH AS PRESAS, COMPUERTAS, AND DESAGÜES, AS WELL AS INTRODUED US TO ITS REMARKABLE EMBUDO RESIDENTS.

SATURDAY JUNE 8

OUR SECOND FIELDVISIT, IN WHICH OUR FOCUS WAS ON UNDERSTANDING THE SPATIAL LAYOUT OF THE TEN ACEQUIA MADRES. ESTEVAN ARELLANO INTRODUCED US TO SOME OF THE MAYORDOMOS WHO SHOWED US PART OF THEIR DITCHES

SATURDAY JULY 12

OUR FIELDVIST TO THE SOUTH VALLEY WAS FOCUSED ON SELECTING DITCH SEGMENTS THAT NEEDED TO BE MAPPED FOR THE SOUTH VALLEY MAPPING PROJECT. James Maestas is a commisioonado for the south valley acequia association and is heading its mapping efforts.

WORKSHOP


Mapping Traditional Landscapes in New Mexico Communities

MAPPING TRADITIONAL LANDSCAPES IN NEW MEXICO COMMUNITIES

GOALS OF THE WORKSHOP:

- •RECRUIT STUDENTS FOR A SUMMER COURSE FOCUSED ON MAPPING TECHNIQUES
- •FOSTER COMMUNITY COLLOBORATION AND UNDERSTANDING OF MAPPING TECHNIQUES

THE GOALS OF THE WORKSHOP ARE TWOFOLD: ONE IS TO RECRUIT STUDENTS FROM THE EDUCATIONAL INSTITUTIONS AS WELL AS THE COMMUNITY FOR A SUMMER COURSE IN WHICH STUDENTS WILL LEARN MAPPING TECHNOLOGIES FOCUSED ON CULTURAL LANDSCAPES. THE SECOND GOAL IS TO PROMOTE A DISCUSSION ON HOW THE MATERIAL GENERATED BY THE COURS CAN SERVE THE BROADER NEEDS OF NEW MEXICO COMMUNITIES.

THIS WORSKOP BRINGS TOGETHER COMMUNITY MEMBERS, ACADEMIC RESEARCHERS, AND OTHERS TO DISCUSS HOW MAPPING TECHNIQUES UTILIZING THE LATEST GEOSPATIAL TECHNOLOGIES INCLUDING GPS, GIS, AND REMOTE SENSING CAN HELP MANAGE AND PRESERVE CULTURAL LANDSCAPES.
THIS WORKSHOP SERVES AS A PRECURSOR TO A COURSE OFFERED THIS SUMMER THROUGH CNETRAL NEW MEXICO COLLEGE (CNM) IN COLLABORATION WITH THE UNM SCHOOL OF ARCHITECTURE AND PLANNING. WE ENCOURAGE PROSPECTIVE STUDENTS (CURRENTLY ENROLLED AS WELL AS COMMUNITY MEMBERS) TO ATTEND TO FIND OUT MORE ABOUT THE CLASS AND HOW TO ACQUIRE PRACTICAL MAPPING SKILLS, LEARN INTRODUCTORY GIS, AND PARTICIPATE IN RECORDING OF CULTURAL LANDSCAPES IN LOCAL NEW MEXICO COMMUNITIES.

Mapping Traditional Landscapes in New Mexico Communities

Public Forum & Workshop Agenda

Saturday, April 26th, 2008
9:00 am – 1:00 pm
Auditorium at Pearl Hall, UNM School of Architecture & Planning

Part I: Speakers (9:00 am – 11:45 am)

The speakers have come together to discuss their experiences as they relate to mapping traditional landscapes in New Mexico. This mapping involves not only the physical but the cultural, and as such the speakers will cover a range of topics including community histories (oral and written), management and preservation, and mapping strategies and techniques.

9:00 am -9:20 am
"Introductory Remarks" by Jacobo Martinez, Resource Center for Raza Planning, UNM

9:20 am – 9:45 am
James Maestas, - South Valley Acequia Association

9:45 am – 10:10 am
Sylvia Rodriquez, Department of Anthropology, UNM

10:10 am – 10:35 am
Estevan Arellano, Embudo Valley

10:35 am – 11:00 am
Denise Bleakly

11:00 am – 11:15 am- Break, refreshments

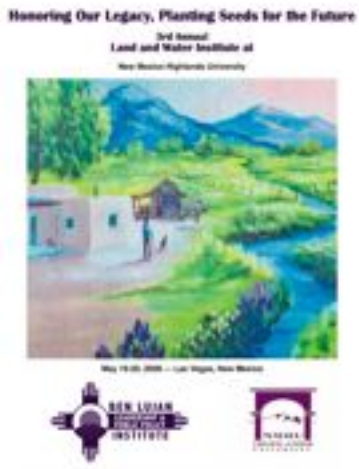
11:15 am – 11:45 am
Amy Ballard (CNM), Judith van der Elst (UNM), Heather Richards (UNM)

Part II- Forum/Discussion (11:45 am – 1:00 pm)

The goals of the forum are to discuss community mapping needs, address technical mapping issues, and provide information on course logistics including how to sign up and funding eligibility.

Workshop supported by a grant from the SPACE Program at the Center for Spatially Integrated Social Science (CSISS)

COMMUNITY MEETINGS



THIRD ANNUAL LAND WATER INSTITUTE MEETING LAS VEGAS - MAY 20
SEVERAL SPEAKERS SPOKE ON COMMUNITY MAPPING IN THE MORNING SPEAKER SESSION. THE AFTERNOON SEVERAL BREAKOUT DISCUSSION GROUPS DISCUSSED COMMUNITY-WATER RELATED ISSUES. WE WERE PART OF THE SESSION ON 'LINKING COMMUNITIES TO UNIVERSITY BASED RESEARCH.

JUNE 13 -14 EMBUDO CELEBRANDO LAS ACEQUIAS A TWO DAY CELEBRATION OF DÍA DE SAN ANTONIO THE SECOND DAY WAS DEDICATED TO COMMUNITY MAPPING INITIATIVES. WE PRESENTED OUR PROPOSED MAPPING STRATEGIES OF THE ACEQUIAS AS PART OF OUR SUMMER COURSE

Celebrando Las Acequias

Friday; Día de San Antonio

7:00 a.m. Procesión de San Antonio de la Junta a la iglesia

10:00 a.m. to 12 noon Water Banking Workshop
Janice Varela, Kenny Salazar, Paula Garcia and Ryan Golten
of the New Mexico Acequia Association

" Poesia y Cante Fables" - Levi Romero y Juan Romero

1:30 p.m. to 4:00 p.m. Easements Workshop
Janice Varela, Kenny Salazar, Paula Garcia and Ryan Golten
of the New Mexico Acequia Association

5:00 Opening of "Acequias, Agriculture and Food in the Embudo Watershed" Art Exhibit

6:00 Cena Comunal

Música con los Coyotes del Cañoncito, Cipriano Vigil, Roberto Mondragón y Arsencio Tafoya

7:30 Presentaciones de Reconocimiento by Dr. Estevan Rael-Galvez, State Historian
Aaron Griego, Mayordomo Acequia de la Plaza, 50 years, The Pablo Romero Lifetime Mayordomo Award

Fred Martinez, the San Ysidro Labrador Award, in recognition of his work with his orchard and huerta and his work in maintaining the Acequia Leonardo Martinez in Cañoncito

Saturday; Mapping the Acequia Landscape

9:00 a.m. to 1:00 p.m.
1. Mapping the Querencia: The Commons and the Uncommon
Juan Estevan Arellano, Writer-Historian and acequiero

2. Embrace All Your Heritage: The Role of Genealogy
Lorraine Aguilar, Educator and Genealogist

3. Multi-Media Mapping of the Acequia Landscape
Denise Bleakley, Geographer, Sandia Lab

3.Water, Architecture, and Adaptation in the American West: Learning from Embudo/Dixon
Hadley and Peter Arnold, Woodbury School of Architecture, Los Angeles

4. Mapping the Embudo landscape: creating a cultural atlas of the acequia system
Heather Richards-Rissetto and Judith van der Elst, University of New Mexico School of Architecture

SUMMER COURSE

LEARNING TECHNICAL SKILLS

UNDERSTAND THE USABILITY OF A GIS FOR ACQUIA COMMUNITIES
UNDERSTAND THE NEED FOR GOOD GIS DESIGN
LEARN THE BASICS OF OF DATA COLLECTION WITH GPS AND DATA INTEGRATION INTO GIS

GPS: TOPCON
GIS: ARCGIS 9.2

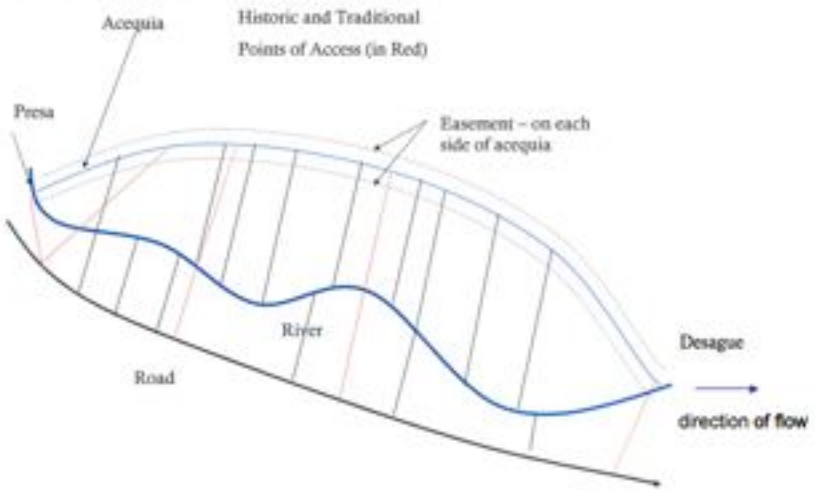
LEARNING ABOUT ACEQUIAS

WATER RIGHTS ADJUDICATION CRITERIA:

SOURCE OF WATER
PLACE OF USE
PURPOSE OF USE
POINT OF DIVERSION
PRIORITY DATE
AMOUNT OF WATER
AMOUNT OF WATER

ACEQUIA RIGHTS:

SHARING OF LABOR, SHARING OF WATER
EASEMENTS



CREATING A DATA DICTIONARY

COURSE SYLLABUS

Mapping Acequias: course syllabus
Summer 2008

General course information:

Course instructor(s):
Amy Hetherl (ahetherl@unm.edu) – instructor
Heather Richards (hrichter@unm.edu) – assistant instructor
Judith van der Elst (vdelstj@unm.edu) – assistant instructor

Course number:
GIS 2096 (one-credit option)
GIS 2196 (three-credit option)

Course schedule:
July 17- 10:00am- 12:00pm- organizational meeting, required

July 18-20
July 18
8:00am - meet at CNM
9:30am-2:30pm - field day South Valley (meet at Hispanic Cultural Center)
3:30pm-5:00pm - CNM Lab
July 19
9:00am-2:00pm - field day South Valley (meet at Hispanic Cultural Center)
2:30pm-5:30pm - lab work at CNM
July 20 – Lab day (only required for GIS 2196)
8:00am - meet at CNM

July 24-27
July 24
6:45am- field day, Embudo Valley (meet at CNM)
July 26
9:00am-2:00pm – field day, South Valley
2:30pm - lab work at CNM
July 27 – Lab day (only required for GIS 2196)
9:00am - meet at CNM

In addition, extra lab time can be scheduled from Aug 6-7 for those who need to finish their project/maps.*

Course objective:
The goals of this course are twofold: (1) to teach students the basics of data collection using Global Positioning System (GPS) units in the field and (2) integrate these collected data within a Geographic Information System (GIS) in the lab. The focus will be on the specific data needs of acequia communities, defining the project goal, creating a data dictionary, and defining a strategy to collect data that can fulfill those basic system requirements.

Students are expected to actively participate in the data collection in the field and acquire a basic understanding of GPS and how the collected data are used within a GIS. At the end of this short course students will also have a basic understanding of the differences and similarities between urban and rural acequia communities.

Students that have signed up for the lab can choose between the assigned exercises and a project. If the level of the student's knowledge exceeds the material presented in the assigned exercise the student can propose a project and arrange a project time line with the instructor(s).

Course background:
Acequia communities form a distinctive part of the New Mexican cultural landscape. Continuation of these systems is not only of importance to many New Mexican families that are dependent on these systems for their livelihood (cultural /subsistence), but is equally important for eco-economic health, sustainable development, and scientific water management. Water has always been a scarce and precious resource in New Mexico, however, today, with a growing demand on water for urban and industrial growth, many of the acequia communities are threatened by encroaching development. Therefore, access to information becomes essential and collecting this information in a geographic database is an ideal way for acequia communities to gain access to and an understanding of necessary information.

Course Schedule:
July 17- Organizational meeting:
During this meeting, course material (field maps and GPS manuals) will be handed out. In addition, course logistics will be discussed and information on travel to and from field locations, scheduling issues, and a general background to course will be discussed.

Weekend 1: July 18-20
July 18 (Friday):
8:00am, Meet at the CNM Lab
- review of GPS Manual
- build Data Dictionary in GPS Units

9:30am-11:30am, Meet at Hispanic Cultural Center, South Valley
- hunt GPS unit (students will all be together)
- review tasks for afternoon field work

11:30-12:30pm, Picnic lunch at Wetlands

12:30-2:30pm
- data collection in groups along assigned ditch
- return to vehicles by 3:00pm

3:30pm-5:00pm, Lab work at CNM
- return GPS Units
- Data download
- View data using New Mexico RGIS website

July 19 (Saturday):
9:00am-2:00pm, Meet at Hispanic Cultural Center, South Valley
- Field mapping assigned ditches
- map laterals or other acequia features

2:30pm-5:00pm, Meet at CNM Lab
- break into two groups (beginners and advanced)
- *Exercise 1*: Introduction to ArcGIS 9.2 (ArcGIS software); outline data sources, adding data, and begin to explore features of ArcGIS

July 20 (Sunday) – only students taking 3-credit option
9:00am, Meet at the CNM Lab

9:00am-12:00pm
- *Exercise 2*: Explore the ArcGIS Environment – South valley maps, attribute tables, perform joins (parcel data), explore raster and non-spatial data, attribute and location queries, buffers, area calculations, and basic cartography (symbology, labels, etc.)

12:00pm-1:00pm, Lunch

1:00pm-5:00pm, CNM Lab
Break into groups
- Continue working on Exercise 2
- Advanced Students work on Atlas

Weekend 2: July 23-27
July 25 (Friday):
6:45am- Meet at CNM for Embudo Valley Field Day
- GPS data collection in assigned groups
- Learn about rural acequia systems and various attributes that can be collected about an acequia system
- Work with rural mayordomo

July 26 (Saturday):
9:00am- 2:00pm, Meet at Hispanic Cultural Center, South Valley
- field work- think about how to integrate newly acquired mapping knowledge from both urban and rural contexts to explore how to design acequia GIS systems- how can we improve our data collection strategies based on the goals for urban and rural acequia communities?

2:30pm-5:00pm, Meet at CNM Lab
- Download new data

Break into groups
- *Exercise 3*: Introduction to Atlas

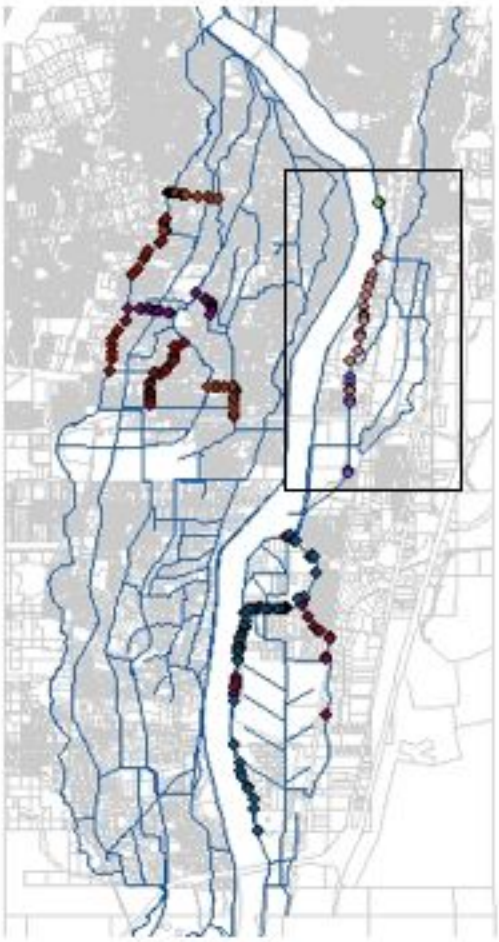
July 27 (Sunday) – only students taking 3-credit option
9:00am-5:00pm, Meet at CNM Lab
Break into groups
- *Exercise 4*: Georeferencing Data- assigning spatial reference to scanned assessor maps
- *Exercise 5*: Digitizing Data- creating vector data from georeferenced assessor maps
- *Exercise 6*: Creating Atlas Maps
- Work on atlas maps

WEEK 1

JULY 18

8:00 AM - MEET AT CNM
9:30AM -2:30 PM - FIELD DAY SOUTH VALLEY
3:30PM-5:00PM - CNM LAB

THIS DAY WAS FOCUSED on INTRODUCING AND TEACHING HOW TO USE THE GPS UNITS AS WELL AS BEING ABLE TO RECOGNIZE THE FEATURES THAT NEED TO BE MAPPED AND ATTRIBUTES THAT NEED TO BE RECORDED. ALL STUDENTS WORKED IN TEAMS OF THREE BUT STAYED IN ONE LARGE GROUP DURING THE MORNING SESSION.



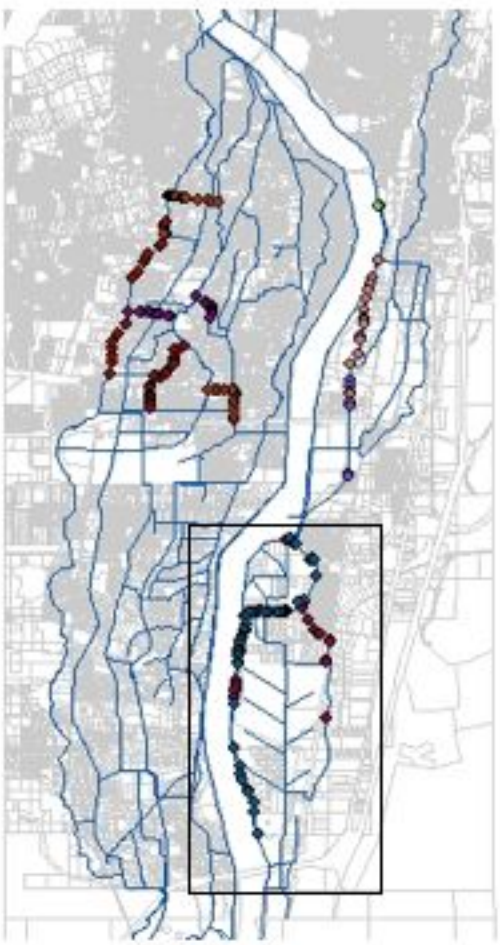
SVAA Acequia Mapping Project - july 18

WEEK 1

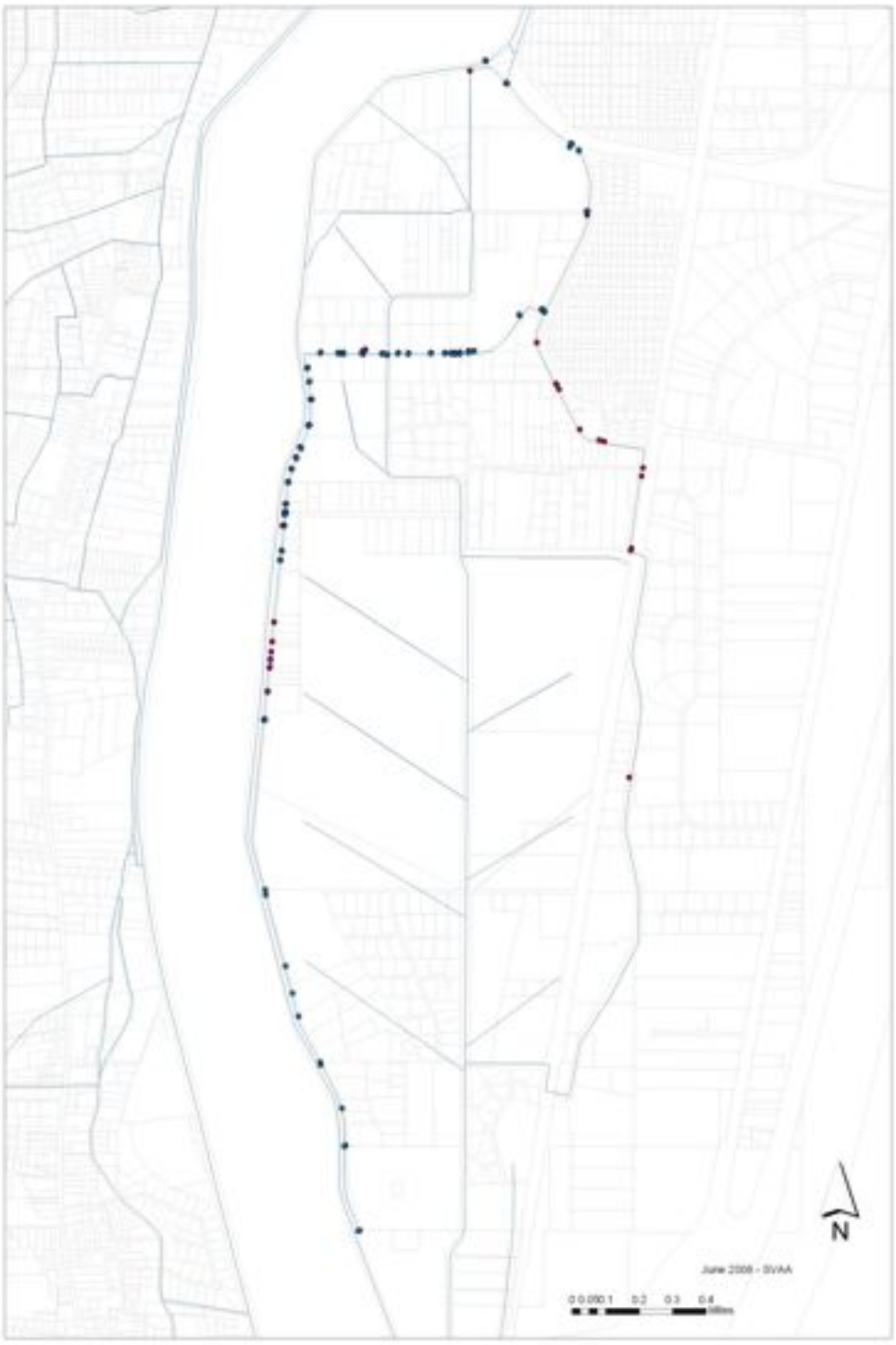
JULY 19

8:00AM-2:00PM - FIELD DAY SOUTH VALLEY
2:30PM-5:00PM - LAB CNM

DURING THE SECOND DAY, EACH TEAM WORKED INDEPENDENTLY AND COLLECTED DATA FROM DIFFERENT SECTIONS OF THE ACEQUIA SYSTEM.



SVAA Acequia Mapping Project - july 19



WEEK 1

JULY 20

9:00AM-5:00PM - LAB AT CNM

THE LAB EXERCISE WAS FOCUSED ON LEARNING DIFFERENT GIS SKILLS AND WAS FRAMED BY THE REQUIREMENTS THAT THE ADJUDICATION PROCESS DICTATES. FOR INSTANCE, INFORMATION ON THE LOCATION OF DIVERSION DAMS, HISTORIC LAND CLASSIFICATION AT SPECIFIC BENCHMARK DATES, TO NAME A FEW.
STUDENTS LEARNED TO QUERY, SELECT, AND PERFORM BASIS ANALYSIS, EDIT TABLES, AND GEOREFERENCE HISTORIC MAPS.

Angostura Diversion Dam, Algondones New Mexico

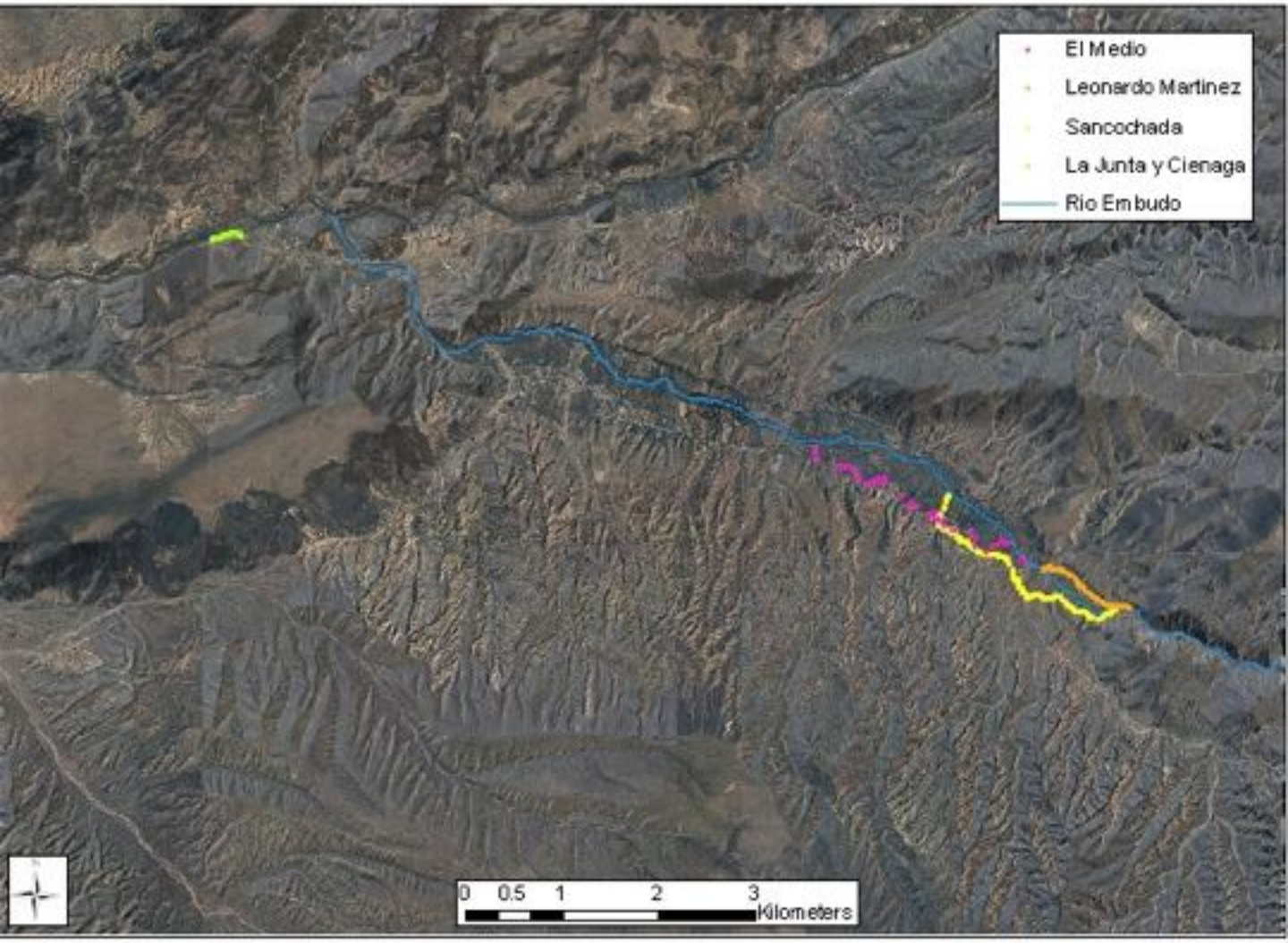
WEEK 2

JULY 25

6:45AM - FIELD DAY EMBUDO (MEET AT CNM)

DESCRIPTION OF OUR FIELD DAY:
AFTER MEETING AT THE PLAZA IN DIXON WITH ESTEVAN ARELLANO, THE DIFFERENT FIELD TEAMS WERE BROUGHT TO THE DITCHES THAT WERE GOING TO BE MAPPED AND MET UP WITH THE MAYORDOMOS, WHO WOULD GUIDE THEM ALONG THEIR DITCHES.
THE FIELD TEAMS EXISTED OF 4 PEOPLE FOR THIS DAY, AN EXTRA TASK WAS ADDED: IN ADDITION TO MAPPING THE ACEQUIA FEATURES, SUCH AS HEADGATES, TURNOUTS, DAMS, AND DRAINAGE. A SECOND GPS UNIT WAS USED TO COLLECT DATA TO CREATE A LINE FILE FOR THE DITCH ITSELF.
THE STUDENTS ALSO LEARNED ABOUT THE DIFFERENT TERMINOLOGY, I.E. TRADITIONAL SPANISH TERMS FOR THE ACEQUIA FEATURES.

Embudo Valley: Acequia GPS Data

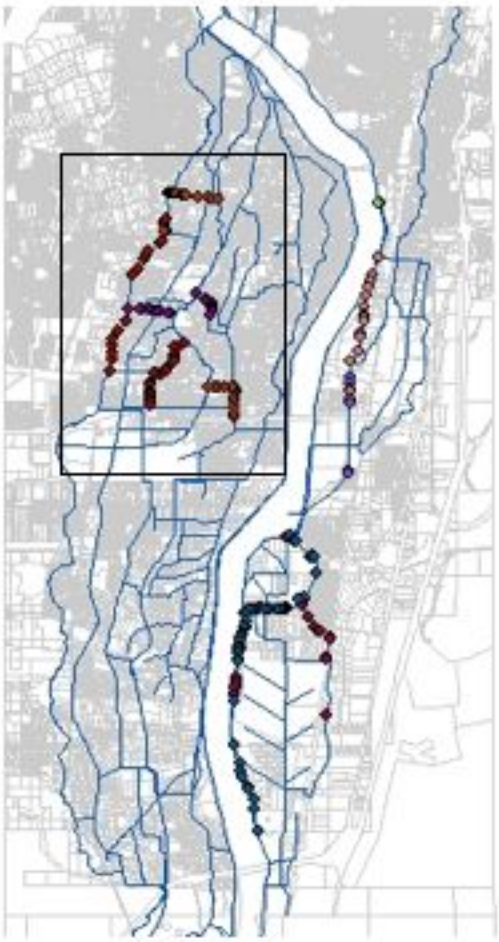


WEEK 2

JULY 26

8:00 AM - 2:00PM FIELD DAY SOUTH VALLEY
2:30PM -5:00PM LAB CNM

ON THIS DAY WE CONTINUED OUR MAPPING EFFORTS IN THE SOUTH VALLEY, ON THE WEST SIDE OF THE RIO GRANDE, SHOWING THE STUDENTS THE REMARKABLE DIFFERENCE FROM THE EAST SIDE. MANY OF THE RESIDENTS ON THE WEST SIDE WERE FORCED TO SELL THEIR PROPERTY IN THE PAST, THEREFORE THE PARCELS ARE MUCH SMALLER. WE HAD LUNCH ON THE SANCHEZ FARM, WHICH IS COMMUNITY OWNED.



SVAA Acequia Mapping Project - july 26

WEEK 2

JULY 27

9:00AM- 5:00PM - LAB AT CNM

ON THE LAST DAY OF THE COURSE, A LAB DAY, STUDENTS WERE EXPOSED TO A FEW MORE SKILLS IN GIS IN THE MORNING, WHICH PREPARED THEM TO WORK ON THEIR OWN PROJECTS IN THE AFTERNOON.
THE STUDENTS HAD FORMED TEAMS ON THE PREVIOUS DAY AND SUBMITTED A BRIEF PROPOSAL FOR THEIR FINAL PROJECT.

STUDENT PROJECTS

Protecting the historical acequias water rights in the adjudication of the Middle Rio Grande Basin

Prepared by Barbara Lybrook, James Maestas, and Jeff Simpson

2007 County Parcels

MRGCD Conveyances

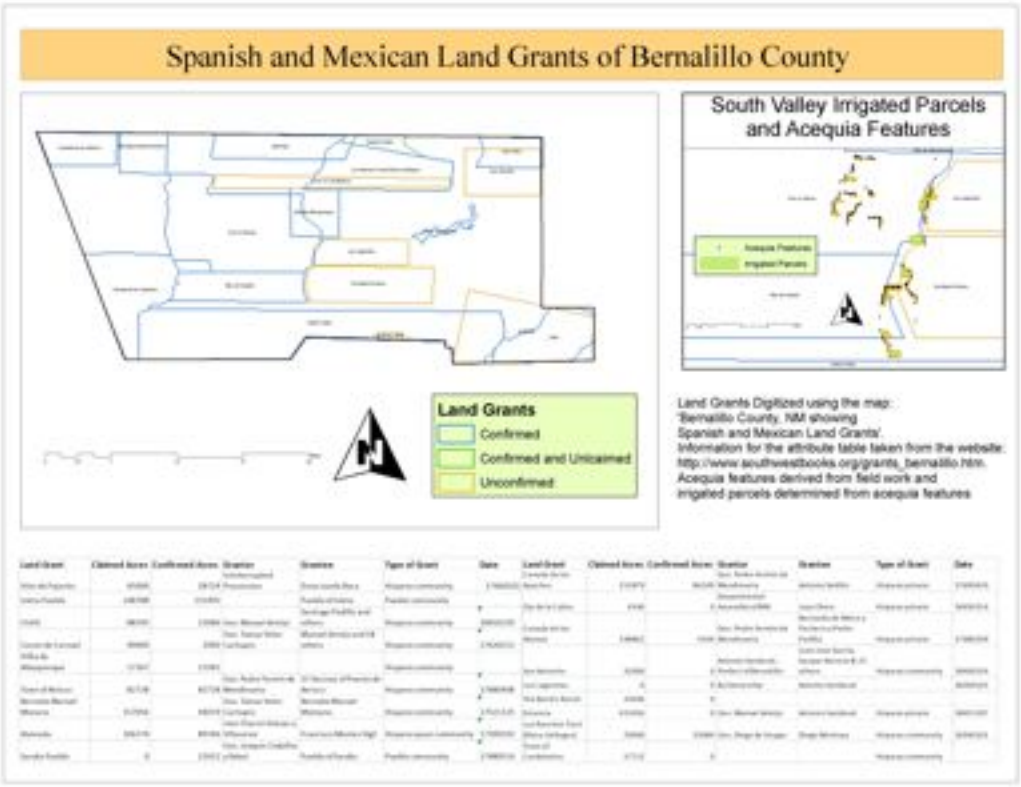
Georeferenced Images

1917 Digitized Map 1926 Digitized Map 1893 Land Grant Map

The above images are land use maps from 1917 and 1926. We georeferenced the images and then digitized areas on shapefiles that corresponded to cultivated areas on the maps. We then took these shapefiles and intersected them with the 2007 County Assessors parcel layer. The intersected parcels are shown in the map confirming that these parcels where irrigated in the past. The 1893 Land Grant Map from the Surveyor General helped to establish acequia Priority Date.

Once the current county parcels where identified, we can now pull ownership information from the county database to calculate the parcel acerage, diversion, and consumptive use of acequia water.

Project and poster created by:
Barbara Lybrook
James Maestas
Jeff Simpson



Project and poster created by:
Daryll del Frente

GIS Mapping Acequias in South Valley & Environmental Justice : Air, Water & Land Pollution

Eric Mora, Lisbeth Iglesias-Rios & Vicente Quevedo

Central New Mexico Community College

Introduction

Acequias is the Spanish word for *irrigation canal*. It is derived from the Arabic word *as-saquiya* (water carrier). The Arabs brought the technology to Spain during their occupation of the Iberian Peninsula. The technology was adopted by the Spanish and utilized throughout their conquered lands. Secondary and lateral ditches are called sangrias, a metaphorical term that expresses the same wisdom as the Spanish saying: "*El agua es la sangre de la tierra*," or "Water is the blood of the land" in English (New Mexico Acequia Association, 2008). Most acequias in the Southwest were established more than 200 years ago; traditional cultures in arid landscapes of the Southwest developed irrigation systems to irrigate floodplain valleys along streams and rivers (Fernald et al., 2007). Many of these traditional irrigation systems continue to be used today as is the case of the acequias in the South Valley of Albuquerque, New Mexico.

- The cultural and historical relevance of the *Acequias* lies in the fact that these communal irrigation canals were, and continue to be, the foundation of agricultural systems in the region. Within this historical context, a self-governing body was created based on the principles of equity and rotation (New Mexico Acequia Association, 2008).

Environmental Health

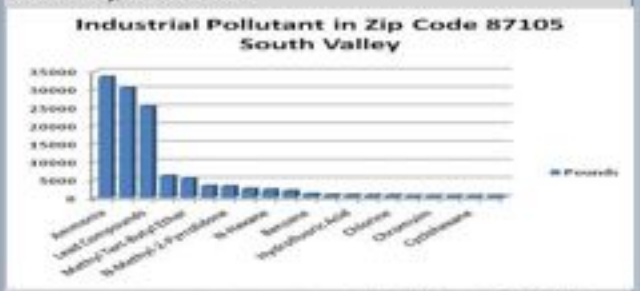
- Population growth, urbanization and industrialization in the region have created a disproportionate social and environmental impact on the preservation of the ecosystem of the acequias in the South Valley, and has altered their hydrologic features.
- The area has been heavily impacted by hazardous industrial waste sites, including Superfund Sites that have been included in the national priority list of the Environmental Protection Agency (EPA).
- The chemicals found in Superfund Sites contaminate natural resources, such as ground water, and are known for their negative effects on human health and the environment (EPA, 2008).
- According to Bernalillo County Environmental Health Department data, the South Valley (the communities of Mountain View, Los Padillas, Pajarito Mesa and San José) has 36 polluting industries that are regulated by the EPA (County Planning Commission, 2008).
- The characteristics and demographics of the South Valley area made pollution –water, land and air- in the acequias a public health priority.

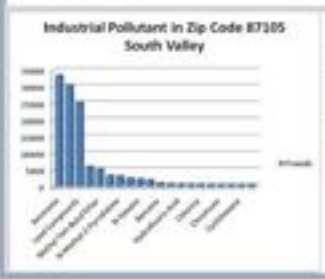
Environmental Health: South Valley Area

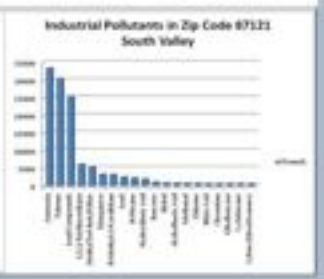
- The South Valley of Albuquerque represents a more gentrified area in which the majority of the population is from Latino origin (76.7%), is primarily Spanish-speaking, and has an important number of foreign-born individuals (9.28%).
- The majority of the population is female and there are more families with children under the age of 18.
- The percentages of children with detected asthma, as well as the number of asthma hospitalizations in children from the South Valley area, surpass the rate of all zip codes combined in Bernalillo County.
- The annual infant death rate in the area of South Valley is almost twice (11.03) the annual infant death rate for all the United States (7.0).

Methods

- The information collected and analyzed for this project was part of a Summer 2008 Central New Mexico Community College (CNM) course entitled: *Mapping Acequias (GIS 2195)*.
- Maps of the Acequias in the South Valley area of Albuquerque, New Mexico displaying points where pollution (air, water & land) was observed were done with Arc Map GIS Software Program.
- Trimble GeoXM (navigation unit) & Topcon GNSS unit. Additional data was collected through photos and field notes.
- Criteria for the publications reviewed in this study include peer reviewed articles and articles from Gray Literature sources related to the Acequias in the South Valley, environmental inequities, environmental justice, and environmental racism. The database JSTOR, and SciSearch, Environmental Sciences and Pollution Management were searched using keywords such as: *acequia, irrigation, inequities, environmental justice, South Valley, and toxic waste.*





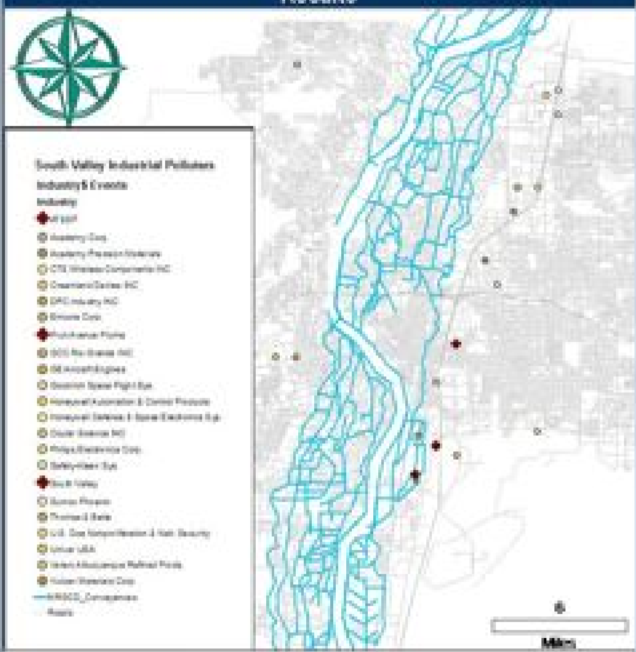


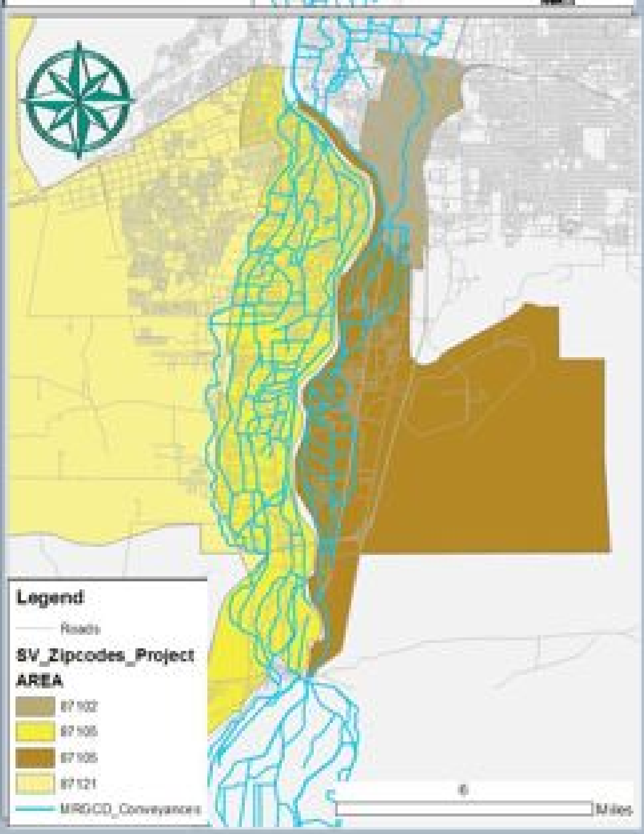
GIS Mapping Acequias in South Valley & Environmental Justice : Air, Water & Land Pollution

Eric Mora, Lisbeth Iglesias-Rios & Vicente Quevedo

Central New Mexico Community College

Results



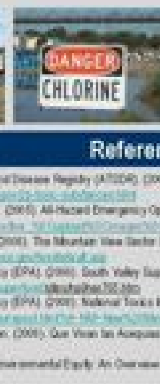


Results: Environmental Inequities

- There is strong evidence in the literature that a disproportionate burden of industrial and other pollutant exposures in ethnic/racial minority communities increases the level of inequity in the distribution of environmental hazards among minority groups.
- Some explanations are attributed to the level of disempowerment and political, economic, and racial bias/discrimination towards minority communities, which makes them more vulnerable targets for the allocation of environmental burdens (Higgins, 1993; Bullard, 2001).
- Some explanations are attributed to the level of disempowerment and political, economic, and racial bias/discrimination towards minority communities, which makes them more vulnerable targets for the allocation of environmental burdens (Higgins, 1993; Bullard, 2001).
- For instance, companies tend to locate environmentally hazardous industries in communities that are poor, less informed, less organized, and less influential (politically & economically) in governing bodies (Pinderhughes, 1996). Companies also take advantage of a communities' need for local job development efforts thus ensuring less community opposition (Bullard, 1983, 1993).

Conclusions

The inequities in the South Valley area as presented above in terms of demographic characteristics, health indicators and environmental factors have a disproportionate impact on the population and the acequias located in the South Valley. This is especially critical because the South Valley area contains an important number of vulnerable groups children and young pregnant women. Therefore, failure to consider these elements may exacerbate disease, poverty, and environmental problems which consequently could undermine the preservation of the ecosystem of the acequias as well as the socio-economic growth of Bernalillo County.



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EVALUATION

COURSE SPECIFIC

THE ACEQUIA MAPPING (pilot) COURSE did not require any prior knowledge of GIS or GPS. The level of expertise was therefore mixed with regard to technical expertise, but also with regard to content specific knowledge, e.g. cultural and historic knowledge of the *acequi*a system in New Mexico.
We had anticipated some of these issues and provided some mixed level activities, however for the future it would be useful to have a better idea of student skill level prior to the start of the course.
Overall, students were satisfied with the skills learned, whether students proficient in GIS, who learned about the acequia systems of New Mexico and had a chance to apply their skills, or students that knew all about *acequias* but learned valuable mapping skills. We collected course feedback through evaluation forms.

DOCUMENTING THE PROCESS: PREPARATION AND RESULTS

We plan to submit a paper to the International Journal of Heritage Studies, for a special issue on community engagement, to document our experiences to discuss our preparation, process, and preliminary results in our efforts to provide community training in geospatial technologies.

FUTURE WORK

Several organizations have expressed interest in continuing our efforts of community training in mapping technologies, especially with respect to *acequia* mapping in New Mexico.

ACKNOWLEDGMENTS

WE WOULD LIKE TO THANK THE FOLLOWING INDIVIDUALS AND ORGANIZATIONS

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AARON GRIEGOS

SOUTH VALLEY:

JAMES MAESTAS

ALBUQUERQUE:

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ENRIQUE LAMADRID, DEPT. OF CHICANO STUDIES

DENISE BLEAKLY

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SCHOOL OF ARCHITECTURE AND PLANNING, UNIVERSITY OF NEW MEXICO - THE VIRTUAL ALBUQUERQUE PROJECT
GERALDINE FORBES, TIM CASTILLO, JACOBO MARTINEZ

CENTRAL NEW MEXICO COLLEGE

STUDENTS

students participating in the Acequia mapping course

ELSEWHERE:

CENTER FOR SPATIALLY INTEGRATED SOCIAL SCIENCE
(WWW.CSISS.ORG)

NEW MEXICO ACEQUIA ASSOCIATION
(WWW.LASACEQUIAS.ORG)

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Report design/layout and photo's
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