A.2. River Reserve Areas

According to the municipal decree of construction free zones, 3 different influence zones can be identified:

1. 50 meters around the river course
2. 25 meters around the river course
3. 15 meters around the river course

Having assigned this value to the rivers database, we can use the create buffers option under the theme menu:

Select the theme containing the features to be buffered

Select the field which contains the buffer distance to be used

Select to save the results in a new theme, so that it can be used afterward

Resulting Buffer Theme

Rivers Decree Distance m
- 50
- 12.5
- 7.5

Rivers Reserve Area
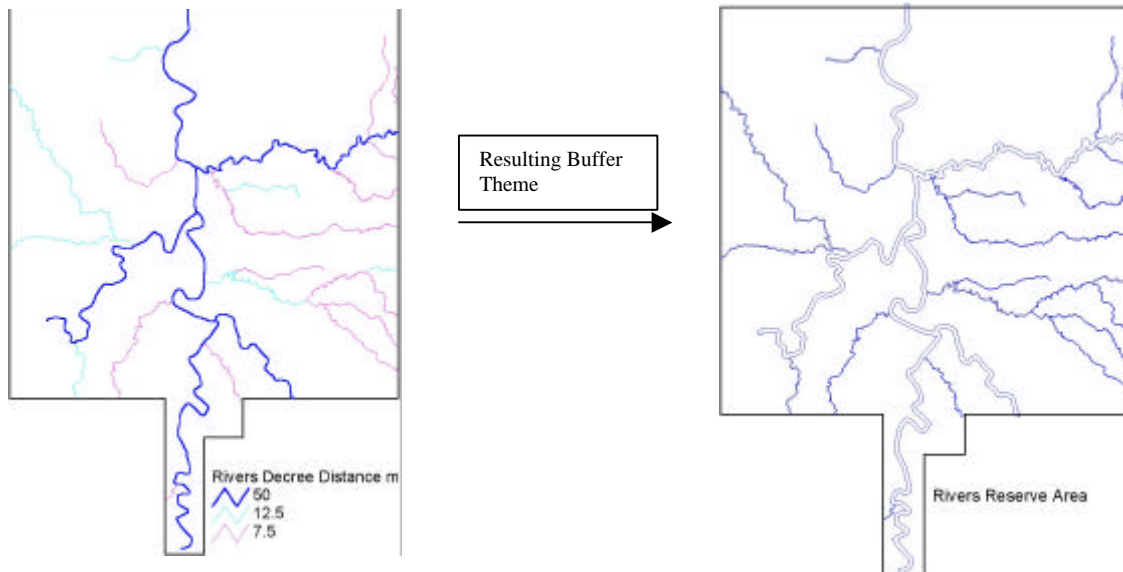
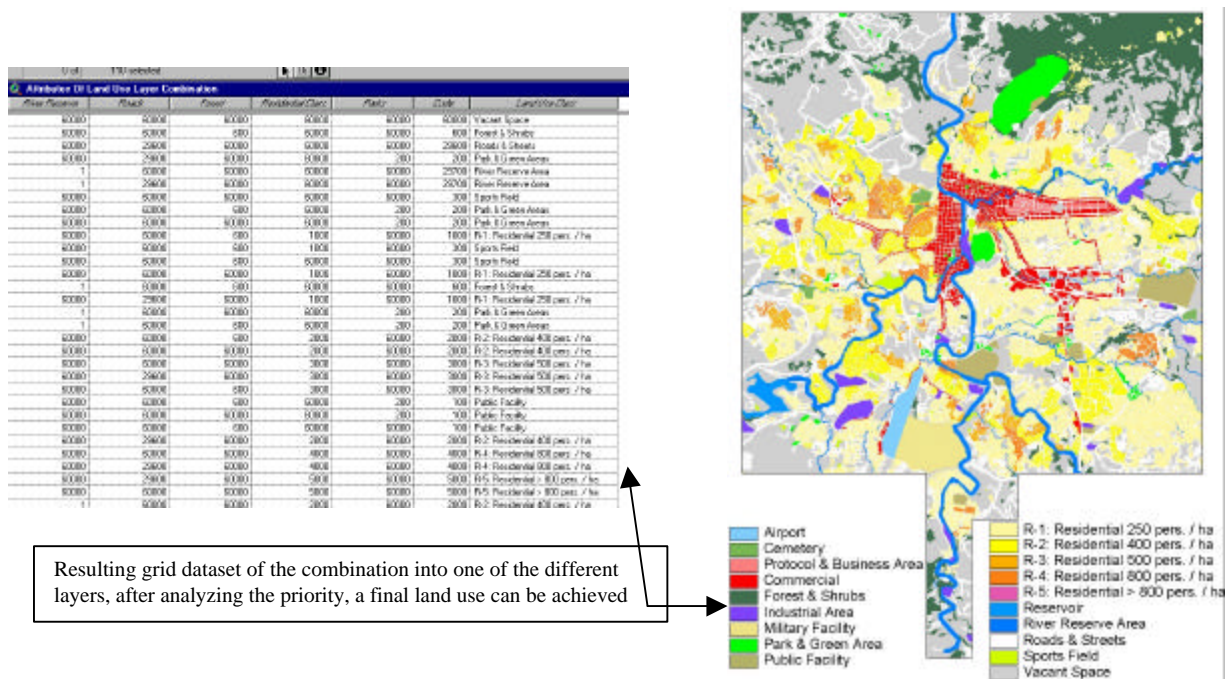The resulting theme must be converted to a grid dataset.

A.3. Roads & Streets

Being Roads & Streets linear features, we need to convert them to a poligonal feature or buffer it, so that it can be merged with other categories to prepare the Final Land Use. We have to follow the same procedure as explained previously to make the buffer areas. The only remark would be to use the same buffer distance for all the features (step 2), instead of assigning specific distances for each type of feature.

A.4. Land Use Layers Combination

Having all the layers in a finished status, meaning they have already been edited and assigned an unique value, they must be combined (explained before) into one grid dataset whose database contains the information of all the layers; a new database field must be added and calculated according to the priority given for each layer. Example: The built up residential areas are less important than the forested areas and more important than the road space.

Representation of the database and resulting land use grid dataset:

Resulting grid dataset of the combination into one of the different layers, after analyzing the priority, a final land use can be achieved

Airport
Cemetery
Protocol & Business Area
Commercial
Forest & Shrubs
Industrial Area
Military Facility
Park & Green Area
Public Facility

R-1: Residential 250 pers. / ha
R-2: Residential 400 pers. / ha
R-3: Residential 500 pers. / ha
R-4: Residential 800 pers. / ha
R-5: Residential > 800 pers. / ha
Reservoir
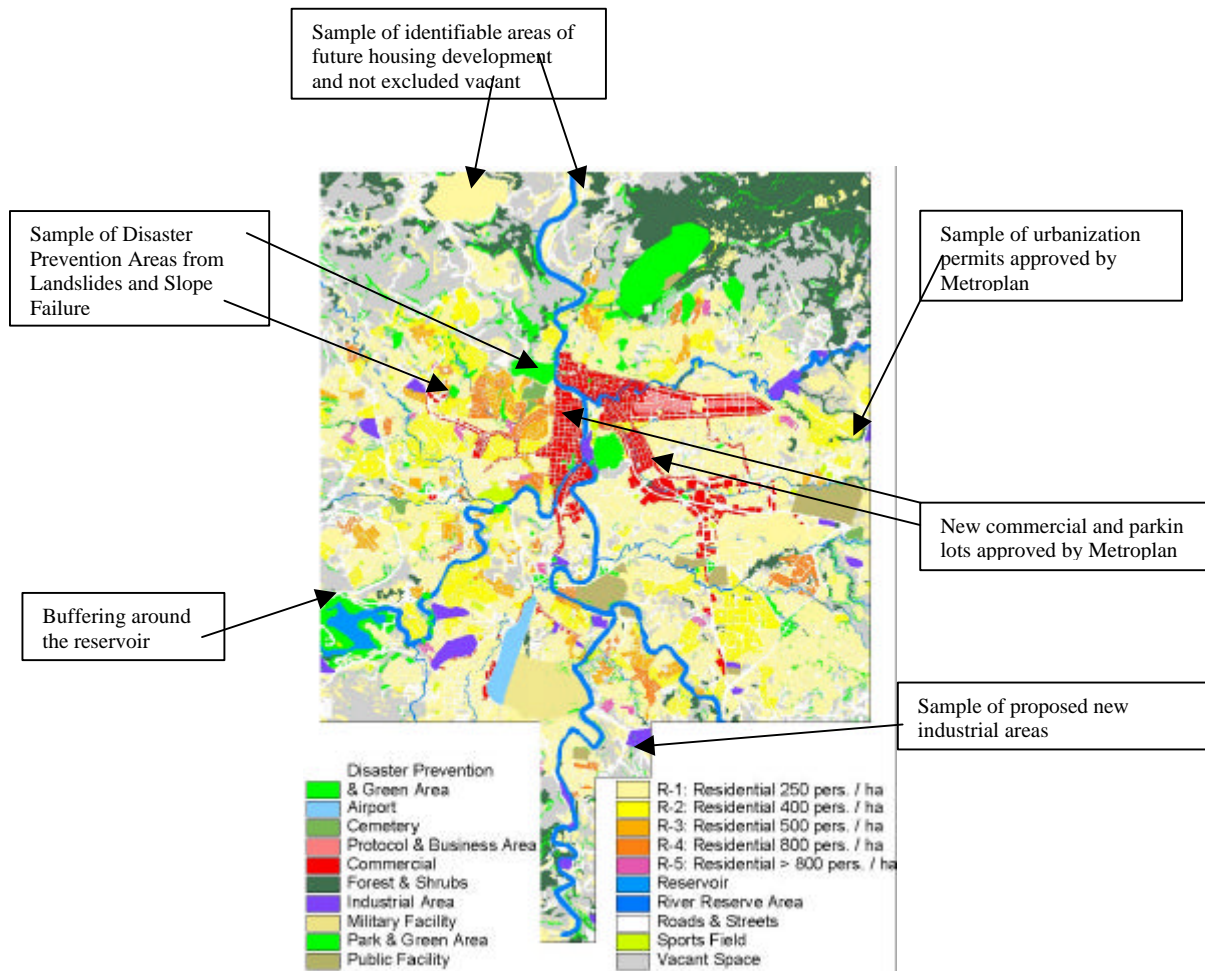River Reserve Area
Roads & Streets
Sports Field
Vacant Space

B. Target Area Future Land Use

This map contains the same features as the existing one, but making an effort to propose the changes for the future one in accordance with the following criteria:

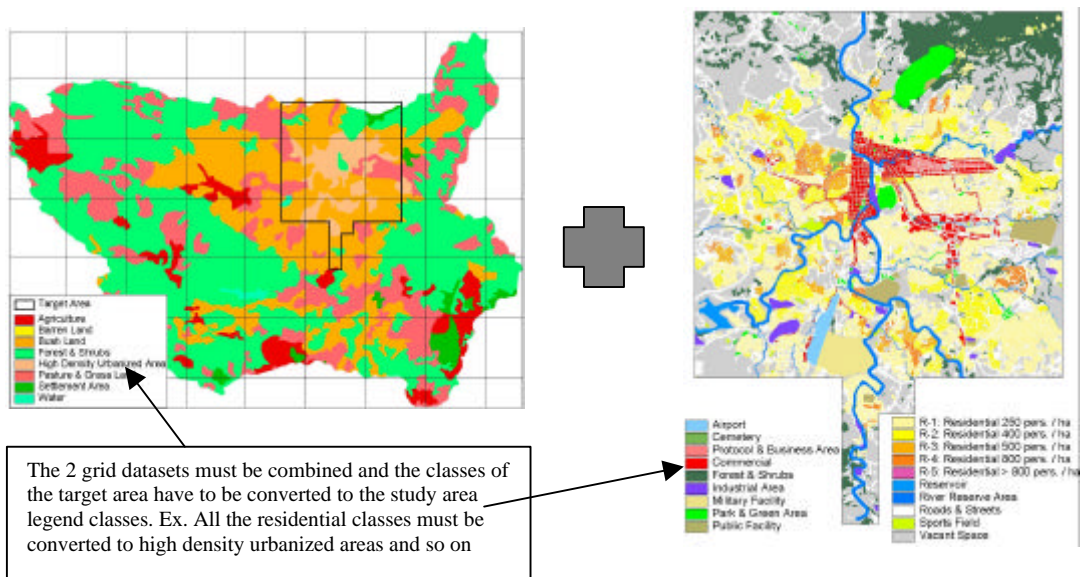| Future Land Use Category	Criteria Used	GIS Activities Applied
Disaster Prevention Green Area	Landslides Type A Affected areas of Landslides A (Except Berrinche, Reparto & Bambu) Slope Failure Rank A	1. Converting the layers to grid (assigning unique values) 2. Mergin the layers into one 3. Reclassifying the grid into one value
Residential Areas	From the vacant spaces in the existing land use, the following should be selected for future residential areas as follows: 1. Housing Development according to Metroplan (urbanization permits) 2. Under development area of housing by recognizing in the orthophoto 3. Accesible distance area of 100 m from existing roads 4. Less than 10 degree slope areas	1.Urbanization Permits Digitizing from Metroplan 2. Screen Digitizing in the orthophoto 3. Buffering of major roads 4.Map query on the slope grid 5. Merging the resulting grids into one 6. Reclassifying the grid into one value
Commercial Area	Information given by Metroplan	Digitizing of proposed areas
Open Space (Parking lot)	Information given by Metroplan	Digitizing of proposed areas
Park & Green Areas	Surrounding 200 meters around the Reservoir	Buffering of the reservoir
Airport, Cemetery, Protocol & Business, Forest & Shrubs, Military Facilities, Public Facility, Reservoir, River Reserve Area, Roads & Streets, Sports Field	Remain with no change	None
Industrial Areas	Information given by Metroplan	Screen digitizing of future industrial areas
Vacant Spaces	After joining all the previous layers into one, all the left out areas (without any land use) were considered as vacant spaces	1. Combine all the finished layers into one 2. Arrange the database (new field) according to priority 3. Reclassifying the grid into final values

All the GIS activities mentioned before have been shown and explained with detail previously.
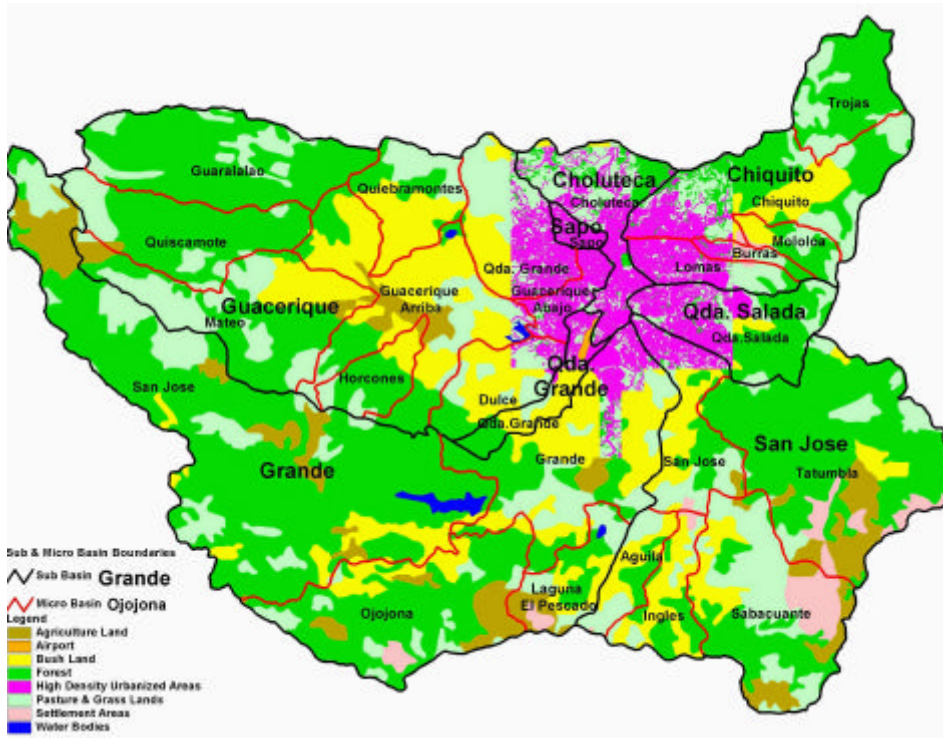
The general procedure consisted of combining the existing land use with the future land use categories that suffered changes, giving the highest priority to those new categories.

Sample of identifiable areas of future housing development and not excluded vacant

Sample of Disaster Prevention Areas from Landslides and Slope Failure

Sample of urbanization permits approved by Metroplan

New commercial and parkin lots approved by Metroplan

Buffering around the reservoir

Sample of proposed new industrial areas

Disaster Prevention & Green Area
Airport
Cemetery
Protocol & Business Area
Commercial
Forest & Shrubs
Industrial Area
Military Facility
Park & Green Area
Public Facility

R-1: Residential 250 pers. / ha
R-2: Residential 400 pers. / ha
R-3: Residential 500 pers. / ha
R-4: Residential 800 pers. / ha
R-5: Residential > 800 pers. / ha
Reservoir
River Reserve Area
Roads & Streets
Sports Field
Vacant Space

C. Study Area Present Land Use

As mentioned previously, the land use information for the Study Area was digitized from 1:100,000, 1987 source. To generate the present land use, this grid dataset was combined with the target area present land use. Assuming no change in the areas outside of the target area.


The 2 grid datasets must be combined and the classes of the target area have to be converted to the study area legend classes. Ex. All the residential classes must be converted to high density urbanized areas and so on

Present Land Use Grid Dataset for the Study Area

D. Study Area Future Land Use

The procedure for the GIS preparation of this grid dataset is completely similar to the previously mentioned one, only that using the future land use for the target area and arranging its classes to the ones used in the study area. Outside of the target area 2 additional criteria were applied:

1. Urbanization permits approved by Metroplan, which were digitized and added as a new class
2. Accesible distance area of 150 meters around existing roads in grass lands. The procedure consisted of generating a buffer around the main roads and combining it with the grass lands.
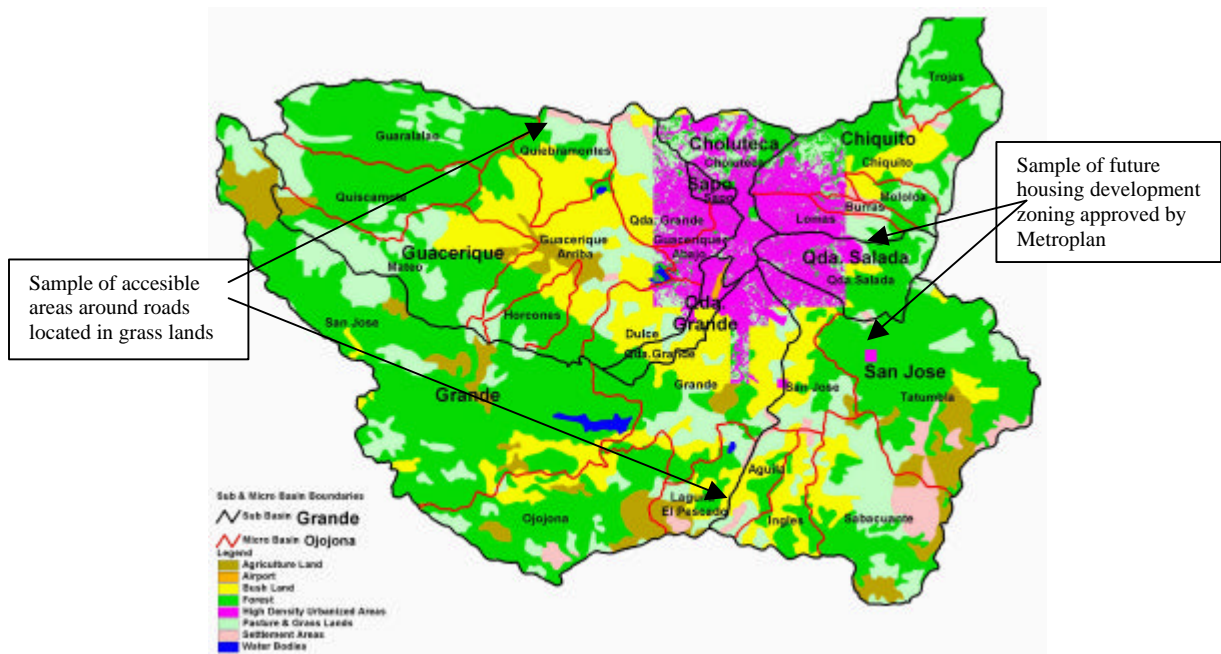
F. Detailed Topo Field Survey (1:500)

1) Explain

A detailed topographic field survey work was conducted to obtain spot heights and elevation contours at 1 m interval. In order to give this work more accuracy, several points were picked up so that its elevation could be obtained from the LIDAR DTEM prepared by the United States Geological Survey USGS, a high technology laser topo survey method.

The original spot heights obtained from fieldwork were merged with the LIDAR points and given to the Topography Company in charge of the final products, so that final elevation contours could be computed.

2) Operate

The points to be used for LIDAR elevation assignment were picked up by using a printout in which the contours derived from LIDAR seemed acceptable for the Geodesy specialist. These points were screen digitized by the Topography Company in a CAD format.

The CAD theme was added and converted to an Arcview shapefile (explained before).

Procedure for obtaining LIDAR elevation:

1. Add the LIDAR DTEM grid dataset
2. Add the Point shapefile
3. From the Grid Analyst menu choose " Extract X,Y,Z Values for Point Theme from Grid Theme"
4. The Point shapefile database now contains the LIDAR elevation value

Procedure for Merging the Original Field Work Points with the LIDAR chosen Points

1. Add the Original Points Theme Shapefile
2. Add the LIDAR Chosen points Theme Shapefile
3. From the Geoprocessing Wizard choose " Merge Themes Together"
4. Complete the parameters settings required
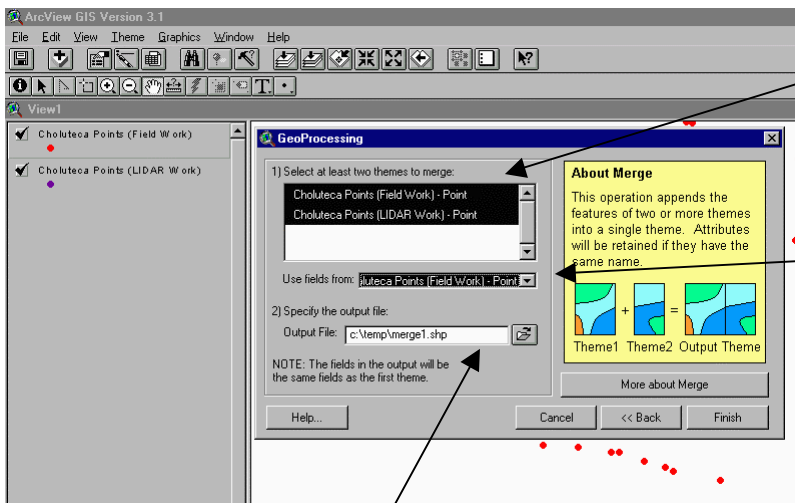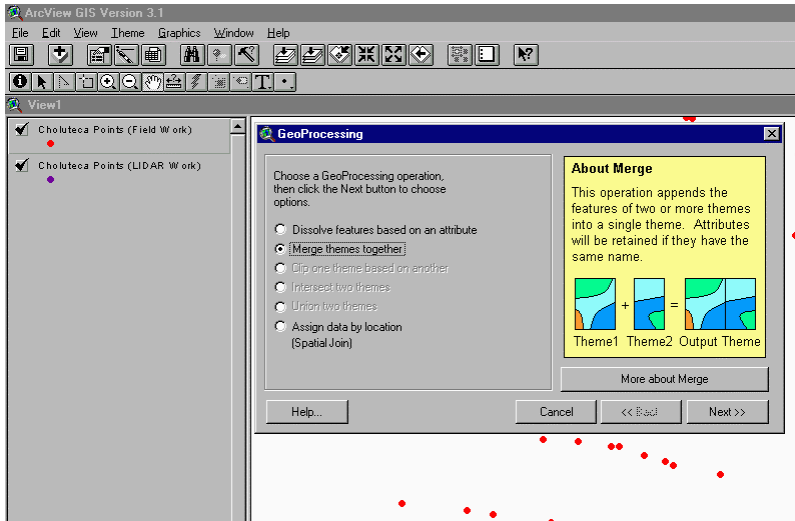
Specify which themes will be merged

Choose the theme from which the fields will be preserved. Be careful to have the Z value in a field with the same name and characteristics in both themes

Specify the output theme to be generated. The resulting shapefile point theme will have all the points from both themes and its original elevation value.