How State Assistance with GIS Helps Communities Say ‘Yes’ to CRS

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CRS Overview

- CRS – Community Rating System
- 5% discount on SFHA policies for each 500 pts. (up to 45%)
- Reduces risk to life and property & keeps more $ in the community
- Benefits:
  - National standards and recognition
  - Technical assistance
  - Consistency for floodplain management program (especially during drought!)
  - Kerjan et al. 2016: 99% of participants stay enrolled

<table>
<thead>
<tr>
<th>CRS Class</th>
<th>Credit Points (ct)</th>
<th>Premium Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In SFHA</td>
<td>Outside SFHA</td>
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<tr>
<td>1</td>
<td>4,500+</td>
<td>45%</td>
</tr>
<tr>
<td>2</td>
<td>4,000–4,499</td>
<td>40%</td>
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<tr>
<td>3</td>
<td>3,500–3,999</td>
<td>35%</td>
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<tr>
<td>4</td>
<td>3,000–3,499</td>
<td>30%</td>
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<tr>
<td>5</td>
<td>2,500–2,999</td>
<td>25%</td>
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<tr>
<td>6</td>
<td>2,000–2,499</td>
<td>20%</td>
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<td>7</td>
<td>1,500–1,999</td>
<td>15%</td>
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<tr>
<td>8</td>
<td>1,000–1,499</td>
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<td>500–999</td>
<td>5%</td>
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<tr>
<td>10</td>
<td>0–499</td>
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CRS Benefits
[Sadiq et al. 2018 - review of 44 studies]

- Increased
  - Flood insurance adoption rates
  - Public participation in mitigation planning
  - Post-disaster reconstruction

- Decreased
  - Property damage
  - Crop damage
  - Claims
    - Michel-Kerjan et al. 2016: -13.5%
  - Casualties
Creditable Activities

• 300 Series: Public Information
  • 320 – Map Information Service

• 400 Series: Mapping and Regulations
  • 420 – Open Space Preservation (2,020 pts possible/4,500 total for Class 1)
  • 440 – Flood Data Maintenance

• 500 Series: Flood Damage Reduction
  • 540 – Drainage System Maintenance

• 600 Series: Warning and Response
### ‘What-If’ Calculator:

**Community:** MANHATTAN, CITY OF

**County:** RILEY COUNTY

<table>
<thead>
<tr>
<th>CRS Class</th>
<th>Per Policy</th>
<th>Per Community</th>
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<tbody>
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<td>$9,856</td>
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<tr>
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**TOTAL**

- PIF: 367
- PREMIUM: $286,856
- AVERAGE PREMIUM: $782

[https://isource.fema.gov/cis/crswhatif.do](https://isource.fema.gov/cis/crswhatif.do)
Protection Motivation Theory

- Threat Appraisal
  - Risk X Probability
- Coping Appraisal
  - Response Efficacy
- Self-Efficacy
  - Wharton Ctr. for Risk Management and Decision Processes (Botzen et al. 2019) - “High response efficacy and a high self-efficacy play an important role in taking flood damage mitigation measures...”
No DFIRM? No Problem!
Activity 320 - Map Information Service – MI4

• LiDAR-estimated 10 ft. elevation contours (+/- 1 ft. accuracy)

• Available from DASC at http://www.kansasgis.org/

• Comparison w/ National Flood Hazard Layer
Activity 420 - Open Space Preservation

• Public or non-profit ownership
• NOT vacant land

• No buildings, fill, or storage

• Must exclude:
  • Bodies of water > 10 acres
  • Impervious surfaces (i.e. basketball court in park)
  • Roof area of buildings (i.e. park pavilions)

• Parcel layer helpful

• Use “Draw” and “Convert Polygons to Features” with paper FIRM

• Comparison w/ National Flood Hazard Layer
Keep an eye out for potential credit from new annexations!
Natural Functions Open Space

• Biological, Hydrological, Sociological Functions

• Data Sources: local staff, CVB brochures/websites, National Wetlands Inventory

• https://www.fws.gov/wetlands/data/Map per.html

• Requirements:
  • Report or plan from qualified agency that includes credited property
  • Memo or letter signed by technical professional

Courtesy U.S. Marine Mammal Commission
Calculating Credit

- Ratio of Open Space/NFOS area to SFHA acreage within City limits

\[ r_{OSP} = \frac{a_{OSP}}{a_{SFHA}} \]

- \(1450 \times r_{OSP} = \text{Point Value}\)

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- Open Space in SFHA

- SFHA

- rOSP Ratio (%)

1450 \times 0.27 = 391.5 \text{ points} 

1450 \times 0.079 = 114.55 \text{ points}
Activity 440 - Flood Data Maintenance

• AMD (Additional Map Data) – 13 possible selections
  • AMD1 (20 pts.) – SFHA, jurisdictional boundaries, streets, parcels
  • AMD2 (26 pts.) – Building footprints
  • AMD3 (12 pts.) – Floodways
  • AMD4 (12 pts.) – BFEs
  • AMD5 (10 pts.) – FIRM Zones
  • AMD6 (10 pts.) – 0.2% annual chance floodplain
  • AMD8 (10 pts.) – LiDAR-estimated elevation contours
  • AMD10 (6 pts.) – FIRMs updated since CRS application
  • AMD12 (14 pts.) – Natural functions areas
AMD2

- Microsoft Bing produced 125,000,000 building footprints
- AI system interprets angle of pixel patterns to ID structures
AMD12

- U.S. Fish & Wildlife Service National Wetlands Inventory
Download data by state

State data can be obtained here: http://www.fws.gov/wetlands/Data/State-Downloads.html or, use the pull down menu below to select the state data you wish to download.

Select a state: Kansas

Download Geodatabase and Shapefile data for Kansas

NOTE: Due to the variation in use and analysis of this data by the end user, each of states wetlands data extends beyond the state boundary. Each state includes wetlands data that intersect the 1:24,000 quadrangles that contain part of that state (1:2,000,000 source data). This allows the user to clip the data to their specific analysis datasets. Beware that two adjacent states will contain some of the same data along their borders.
Benchmark Maintenance

- CORS – National Geodetic Survey “Continuously-Operating Reference Stations”

- 3 CORS within 30 miles (Wichita and KC metro)
  - Use “Buffer” tool; download lat/long from
    https://geodesy.noaa.gov/CORS_Map/

- 27 pts. with SFHA adjustment

Courtesy Mesa County, CO
Activity 540 - Drainage System Maintenance

• CDR (Channel Debris Removal) – 200 pts.

• SBM (Storage Basin Maintenance) - 120 pts.

• PSM (Problem Site Maintenance) – 50 pts.
Google Earth

- FREE
- “Add Path” tool with aerial photo
- Export polylines as KMZ file
  - Contains KML
- ArcGIS “Convert KML to Layer”
  - Attribute table transferred to shapefile
  - Email using KMZ package
Activity 610 - Flood Warning & Response
State of Kansas Stats:

- $200,000 yearly savings
- 36 participating communities
  - 18 with pop. <10,000
  - 4 with pop. <500
- Class 6 to Class 9
Need assistance?

Martin Koch, CFM, NFIP Specialist
martin.koch@ks.gov
785-296-0854

CRS Coordinator’s Manual:

FEMA CRS Info:
https://www.fema.gov/national-flood-insurance-program-community-rating-system

CRS for Small Communities:
https://www.fema.gov/media-library-data/1534966644297-c0fab027d48811267c3b9d53abf78178/Small_Communities_CRS_Fact_Sheet_FINAL_508OK.pdf

Courtesy Boston Fire Department